COMPUTERWORLD

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Software Houses Settle Suits With IBM

NEW YORK – Half of the commercial antitrust plaintiffs have dropped their case against IBM, with varying effects on at least three software products.

Announcement last week that Applied Data Research (ADR), its subsidiary, Programmatics, Inc., and IBM had settled all antitrust litigation out of court left officials of all companies repeating "no comment" when asked about future marketing plans.

One thing is certain: IBM is now free to resume the distribution of its Computer Remote Job Entry (CRJE) program to its time-sharing customers. ADR is undecided on whether it will continue to sell its Roscoe program in competition with IBM's free CRJE.

The biggest question is: What's going to happen to Autoflow, the patented program which tests, debugs, and flowcharts users' software?

Tied to a $1.4 million payment to ADR is a tentative business arrangement whereby, if consummated, ADR would supply Autoflow to IBM.

The arrangement, when finalized, would result in over $600,000 in revenue for ADR over a period of three years, the company said.

One of the most successful proprietary software products available, Autoflow is installed in more than 1,100 DP locations.

The Roscoe and CRJE programs were the subject of a recent restraining order which prohibited IBM from giving away CRJE so that ADR could sell Roscoe [CW, July 15]. That litigation was also dropped, as part of last week's settlement.

ADR President John R. Bennett described his Remote OS Conversational Operating Environment – Roscoe's official name – as a terminal-based testing program which also "enables the remote submission, and retrieval of jobs, the interactive execution of programs in the Basic language, and the performance of other on-line tasks while the computer is processing its standard jobs through OS." The temporary restraining order was issued pending a hearing on an associated feature, IBM's Time-Sharing Option (TSO) for OS/360.

Autoflow 'Arrangement'

Bennett would not discuss the "business arrangement" for Autoflow, except to say that it had not been finalized. IBM had no comment, except to confirm the $1.4 million for "certain costs," incurred in the litigation. A company spokesman would not elaborate on the costs covered by the sum, nor on the possible Autoflow agreement.

The dismissal leaves Control Data Corp. and Data Processing Financial and General, plus the U.S. Government, in antitrust litigation against the computer industry giant, and cuts the amount of damages sought by CDC and DPF&G by $3 billion, or about in half.

ADR is preparing for the sale of Programmatics to Computer Machinery Corp., but Bennett said that the impending sale was not considered in this abrupt end to the antitrust suit.

Justice Dept. Okays Honeywell-GE Merger

CW Washington Bureau

WASHINGTON, D.C. – The Justice Department has agreed to the proposed merger of Honeywell's and GE's computer operations into a new company to be owned and operated by Honeywell.

The new company, Honeywell Information Systems, Inc., would be 81.5% controlled by Honeywell.

Honeywell Shareholders are expected to hold a special meeting Sept. 18 to vote on the merger. It is expected that by that time GE's board will have voted on the proposal.

In a proxy statement mailed to stockholders after the Justice Department approval, Honeywell asked support for the merger and outlined details of setting up the new company.

The statement said that in some cases it will be possible for the new company to develop programming conversion aids to assist a user of a computer presently manufactured by either Honeywell or GE to move his work economically to a computer presently manufactured by the other.

"The two product lines differ substantially both in programming and in their use of peripheral equipment, however, and in many cases the cost of such conversion would be prohibitive," the statement said.

"Customer preferences and investments in programming will make desirable the continued manufacture of certain computers which have closely similar functions and are presently manufactured by the two companies."

The computer business which would be involved in the merger includes more than 50,000 people, 10,000 installations, and more than $3.5 billion in original sales, with $2.1 billion on lease, in 35 countries.

Florida Report Cites City DP Shortcomings

By Edward J. Bride
CW Staff Writer

JACKSONVILLE, Fla. – The city government has been charged with designing and installing "uneconomical data processing systems," training and recruiting personnel with "weak and ineffective" programs, and protecting computer systems with "inadequate" or "nonexistent" security measures.

A blistering auditor's report also blames political pressures and an apparent lack of priorities for seriously hampering the operation of Jacksonville's data processing division.

The report of the 18-month study calls for a complete overhaul of the division, because of "lack of control, a lack of coordination both within the division as well as with agencies using its services, and a failure to enforce written operating procedures."

City council Auditor Gene McLeod noted that the report covered a period beginning with Jacksonville's entry into a new consolidated form of government on Oct. 1, 1968, and ending before the current division chief was selected.

Former director of the DP division, John Bailey, "readily admitted [the shortcomings], indicating political pressures hampered the operation," McLeod said.

Bailey, a retired Army officer, left his municipal post last spring to take a position in private industry. Before he left, he complained to Mayor Hans

(Continued on Page 4)

ACM '70 Convention to Stress 'Consumer' Orientation Theme

By Edward J. Bride
CW Staff Writer

NEW YORK – If they were selling floorspace, ACM '70 would be sold out.

As it is, all available exhibit space has indeed been allocated – free of charge – for next week's (Sept. 1-3) 25th annual meeting of the Association for Computing Machinery (ACM).

Billed as the "unconventional convention," the meeting will feature such unorthodox practices as "providing" rather than selling or renting exhibit space.

Last spring, the ACM advisory committee decided on the public service, rather than vendor concept of the exhibit section of the conference.

Panel discussions will also be aimed at "consumer," rather than "customer" interest. User orientation, then, is the theme; there will be no commercial exhibitors.

Those requesting and receiving booth space comprise such diverse concerns as the Tennessee Valley Authority, which, according to conference chairman Sam Matsa, plans to demonstrate the feasibility of a national bank of electrocardiograms.

Education, Ecology

Also prominent will be the disciplines of education and ecology. A grammar school, a junior college, and the high-school Resistors will be demonstrating what school-age children are doing with automation, especially in computer-aided learning.

(Continued on Page 4)

On the Inside

Switch to New Keypunch Replacements Not an Economy Move for Most Users

By H. Edward White
Special to Computerworld

The potential user of key-to-tape data recorders should be prepared to pay about 10% more per station than he now does with keypunch devices.

Although proper utilization of keypunch replacement devices can ultimately lead to greater efficiencies, the switch to these devices is not an economy move for most users.

Five years ago, Mohawk Data Sciences announced the first of these new machines, a computer compatible magnetic tape data recorder. Since than, about 30,000 units of all makes and types have been installed, or less than 15% of the keypunch and verify machines used in computer installations. Most data recording systems have not been changed. Why?

> During the past two years over 30 companies have developed keyboard-type data recording devices designed to replace keypunch equipment. Apparently these companies believe that many of the estimated 400,000 keypunch and verify devices installed in this country will be replaced by their equipment.
>
> But how valuable are these new devices to the keypunch user? Are they cost effective? Do they increase efficiency?
>
> In this series CW explores the advantages and disadvantages of the keypunch replacement devices.

What Is the Cost?

The first question nearly everyone asks is, "What will the new machines cost?" They vary, but for a "stand alone" device, one that can prepare computer tape directly, the average price for a 9-track output is $165/mo – this compares to about $75/mo for a non-printing model keypunch. If you multiply the number of keypunches and verifiers you rent by $90/mo, you can quickly become discouraged about cost justification. Let us see if we can find a way to "melt away" that differential of $90/mo/unit – and show some savings!

(Continued on Page 18)

Calif. Colleges Say NCR 200 Fails in Requirements

By Phyllis Huggins
CW West Coast Bureau

LOS ANGELES – The California State Colleges (CSC) system is involved in a struggle with NCR over a 200 system at Sonoma State College which it says fails to meet its requirements. NCR says the problem is a political fight within factions of the college system. In contest is the compile speed for the NCR Cobol compiler, a lack of the complete Fortran IV package and inability to communicate with the college network. The colleges also object to absence of full documentation. They further state that NCR was aware of these requirements when it bid.

A possible fault lies in the state colleges' procurement system itself, which does not require that purchased (as opposed to leased) systems meet benchmark requirements before procurement. Therefore, the low bidder takes the order. NCR bid at $185,335 as compared with an approximate $400,000 bid from IBM. As a result, installation of an NCR 200 was made in Oct., 1969. As Dr. George Proctor of Sonoma put it, "We are less than happy."

Happy Users

NCR says it has 70 to 80 happy educational users. CW talked to two of the NCR 200 customers. Bridgeport University in Bridgeport, Conn., said it is having trouble with the disk packs in trying to "read from" or "write in" and while the Cobol compile is very slow it has little student use. However, the university pointed out, there is still no "compile and go" for Cobol. As far as Fortran IV is concerned, "we are still having problems," a spokesman for the university said.

St. Mary's University in San Antonio, Texas, has a different situation. "Cobol compile is slow but not so bad. Coming from an IBM 1401 as we have, it looks good. The 1401 was very-slow in compile for both Fortran and Cobol. NCR's Fortran does not have some features, but we're very pleased with it since the "load and go" feature was added in June. Up until then it was kind of difficult. We use it for student work, but remember, others haven't made as big a jump up as we have from the 1401."

The California State Colleges' procurement is unique in that it has heavy student use and network demands. The full college system includes two CDC 3300s comprising the balance of the network.

The system is also designed to tie in with the IBM 360/91 at UCLA. This communication capability was recently demonstrated as now a working feature of the full network with the exception of the NCR computer. The NCR computer was the only one obtained on a purchase contract.

NCR states that the bid requirements specify that at some future date the equipment will be able to communicate with the full network and that NCR is now ready to demonstrate that capability, but that no order has been placed.

James Farmer, director of information systems for CSC states: "Fine, we have an IBM modem and have been ready for some time for them to demonstrate communication capability but they have not done so."

In regard to the speed of the Cobol compiler, NCR states that it should be put into perspective for the price of the system involved.

"As a company we have prided ourself on our execution time; this may not be valid for student use," said Paul Lappetito, vice-president of product marketing for NCR.

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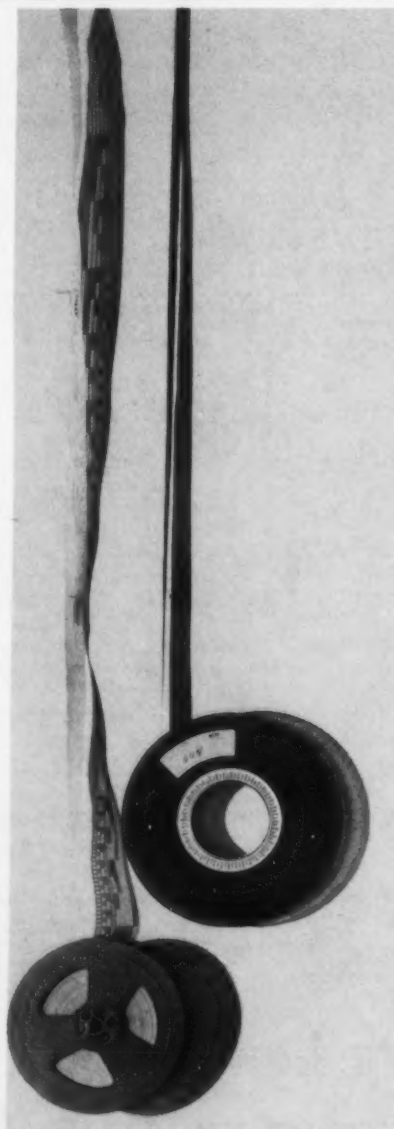

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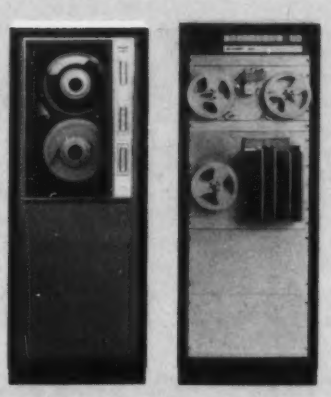

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TALLY

Computer Wins a Battle for City Officials In N.H. Squabble With Federal Census

By Edward J. Bride
CW Staff Writer

MANCHESTER, N.H. – The computer has won at least a minor battle for city officials in their attempt to gain more federal funds and more New England status.

In the process, the 1970 federal census is a step closer to being discredited, maybe even invalidated.

City Assessor John McGranahan told CW last week that the state Planning Board is accepting Manchester's computerized population count, instead of federal figures, for the purpose of awarding the state Room and Meal Tax.

The award is a flat $4 per resident, given back to the cities as their share of state levies on meals and public accommodations. New Hampshire has no state income or sales taxes, and population-based aid is used in distributing most revenue.

There is a difference in population for the federal and municipal courts of about 9,000. This means that Manchester will be $36,000 richer because of the census, which is taken, updated, and validated annually with the help of an IBM 360/30 at a local bank.

The local census became very significant about three weeks ago, when preliminary federal totals were released, placing Manchester's population at 87,343, instead of the computer-compiled 96,722 [CW, Aug. 12]

Federal officials in Boston suggested that college students and military personnel stationed away from home might account for about one-third of the difference.

Arthur Dukakis, deputy director of the regional census office, said that such persons are counted in the population for their physical locale as of April 1, for the purposes of federal aid and representation.

McGranahan countered that there are several hundred students and military personnel in Manchester, who would not fit city criteria for residence, but who would be counted in the federal census. The city assessor therefore opined that only "several hundred" persons might be found as a net loss to the city's census, not the three thousand suggested by Dukakis.

The Boston regional office has requested the U.S. Department of Commerce, which coordinated the census, to forward the maps of Manchester's enumeration districts. When they are received, federal and municipal officials will compile a door-to-door comparison, using the federal register and the Manchester printout to find the "missing" residents.

Dukakis indicated that, while "there's always a chance of error," the federal government could not accept the Manchester figures. If anything, certain areas will have to be rechecked, if "concrete evidence of misses" is produced.

If the federal count becomes official, then the city will rank 10th, behind Lowell, Mass., in New England population.

If the city count, or somewhere near it, is used, then Manchester will jump ahead of Lowell into ninth place.

Program Selects Ethnic Names

CW West West Coast Bureau

LOS ANGELES – A computer program that will select ethnic names from listing references, such as telephone directories, has been developed by Research and Information Systems Enterprises, Inc. (Rise).

This seemingly esoteric use of computers is proving highly practical for different groups. For example, the Republican Party does not want to waste money for printing and mailing literature to Mexican-American surnames as 90% of them are Democratic Party voters. In the same respect, Jewish people are 80% Democratic.

The analysis and algorithms for the ethnic name identification system (Enid) programs were suggested by the work of Oettinger, Garvin and Hays as well as by cryptoanalysts such as Baudoin, Miller and Licklider.

According to Rise executive vice-president, Jack T. White, the basic process of Enid is simple. "Records are read from the input file and the last name isolated. The algorithm compares this last name or elements within the last name to the appropriate tables and determines if the last name falls within the ethnic group. If it does, this record may be selected and written on the output file.

Basic operating instructions are designed for IBM 360 DOS, though manuals are available for other systems. Enid is available on either a lease or purchase arrangement.

Adapso Prepares Bank Litigation

NEW YORK – The Association of Data Processing Service Organizations (Adapso) has filed to reopen its suit against the U.S. Controller of the Currency and the American National Bank of St. Paul.

Adapso and its colitigant, Data Systems, Inc. of Minneapolis, immediately began preparation for the case following the U.S. Supreme Court decision granting them standing to sue.

The original court action was brought by Adapso in 1967 and involved a purported violation of the National Banking Act which precludes banks from engaging in services that are not incidental to banking. The banking industry was permitted to engage in the sale of computer services to the public by an administrative ruling by the U.S. Controller of the Currency.

The case was dismissed in the Federal District Court on the basis that Adapso lacked standing to sue. A negative judgment in the Fifth Circuit Court of Appeals in 1968 was reversed by the U.S. Supreme Court in October 1969, preparing the way for trial on the merits of the case.

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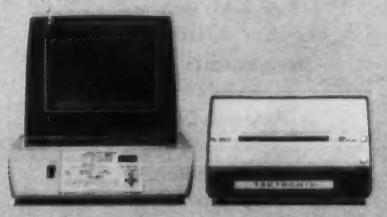

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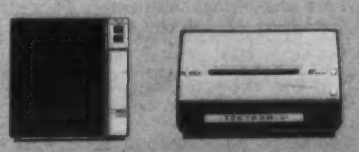

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City's DP Unit Charged With Overall Deficiencies

(Continued from Page 1)

Tanzler that "the real issues are not being faced up to."

In a letter to the mayor, Bailey charged ". . . . the data processing division chief does not have the working-level authority to say 'no' to the systems and reports requests of other departments."

As an example of his charges, McLeod pointed out that the main DP center is in "completely inadequate spaces" and control over computer tapes is "virtually nonexistent."

He added that there is practically no control of personnel access to the center itself.

McLeod pointed out other internal failures, and charged that a "failure of management to resolve conflicts between demands for services and capacity" was a considerable part of the problem.

Other deficiencies named in the report, which was released late in July, included the areas of program documentation and testing, control of service requests, and weak input and output control procedures.

Less Than Adequate

Data processing Director Frank A. Reneke agreed that some division operations were "operating at less than adequate levels of performance," but claimed that "budget restrictions" were to blame in some instances.

Reneke told CW that the DP center was not a "closed shop," and that people walking in the corridors of city hall could enter the computer center.

He said that he was preparing a report for the mayor, and that the report would indicate plans and recommendations for other security measures.

In a recent memorandum to the head of Jacksonville's Central Services Department, Reneke agreed that the security of his DP center is "poor."

He said lack of space for expansion presented a problem. He called for establishment of remote tape libraries to provide "adequate protection for our files in case of any unforeseen emergencies or disasters."

The DP chief indicated that it was "not true" that inefficient systems had been designed.

"There are some reports that we would rather not do, but many are required by statute," he explained.

He also commented that a bipartisan commission had been established to make positive recommendations for the city's DP division. The first meeting was to be last wek, and Reneke said that the auditor's report would be used to help the committee aid him in formulating plans for improvement.

ACM '70 to Open 25th Meeting Aimed at 'Consumers'

(Continued from Page 1)

The National Center for Atmospheric Research, from Boulder, Colo., will be here, along with the New York City Department of Air Resources, demonstrating how computers measure and pinpoint pollution emergency areas.

Lincoln Labs is expected to show how interactive programs can analyze pollution buildup levels for nearness to crisis levels of sulphur dioxide pollution.

ACM President Walter M. Carlson explained that one purpose of ACM '70 is to foster the "start of a dialog between the people being affected by computer technology and the people responsible for the technology."

As such, conference officials will not even "compare" the outlook from this vantage point to a similar period last year. With less than a week to go, Carlson emphasized that ACM conventions are no longer similar to the Joint conferences.

Rather, he said, ACM '70 exhibits will have "relevance to the individual in his every day life," not just to the computer professional.

Walk-In Attendees

For this reason, apparently, ACM is attempting to get a strong walk-in participation from the non-computer community. Admission will be $2 for exhibit-only walk-ins.

There will also be free admission for certain evening sessions, including a new concept: two "Town Hall" meetings.

These question-answer periods, on Monday and Wednesday (8 p.m.), will attempt to explain to attendees "why things always seem to go wrong with their bills and what can be done about it," according to an ACM bulletin.

The $2 entrants will be able to attend sessions on the arts, a chess tournament, a music demonstration, and movies on the use of computers, as well as the exhibits.

Exhibit areas will be open from 11 a.m. until 9 p.m. on Tuesday and Wednesday, and from 11 a.m. to 6 p.m. on Thursday. All events take place at the New York Hilton Hotel.

A constant critic of computerized billing, and credit cards in particular, consumer advocate Ralph Nader will deliver the keynote address Tuesday morning.

Nader has been critical of computerization because, he says, it affords the opportunity for responsible individuals to blame machines for human errors.

Other areas of social concern will also be investigated at various panel sessions, including one entitled "The Computer Professional in the 70s – Facing Up to Responsibility and/or Dissent." It is one of the four "free" sessions.

Participants will represent a broad divergence of political views on subjects such as the war in Southeast Asia, poverty, and the ends to which their skills are being put. A debate on the responsibility of individual protest is expected, and audience participation will be invited.

Other Panel Discussions

Other areas to be explored by panels include: education, engineering and industrial applications, management, transportation, communications, science, humanities, finance, medicine, health and welfare, urban society, and man and his environment.

Conference proceedings will be delayed until December, so that they will be able to include pertinent discussion and conclusions generated during the various sessions.

More than 2,500 hotel rooms have been reserved, and early projections hinted at a preregistration total of around 800. Members paid $50 for preregistration, and will pay $60 at the conference. Non-members add $25, which can be deducted from ACM membership fees at the conference.

Convention Center registration desks will be on the second floor of the New York Hilton Hotel, and will be operating during the following hours:

- Monday, Aug. 31 – 4 p.m. to 10 p.m.
- Tuesday, Sept. 1 – 8 a.m. to 6 p.m.
- Wednesday, Sept. 2 – 8 a.m. to 6 p.m.
- Thursday, Sept. 3 – 8 a.m. to 3 p.m.

Special one-day fees of $35 for both members and non-members will be in effect for the duration of the convention.

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PL/1 Compiler Aids Diagnostics

WHITE PLAINS, N.Y. – IBM has again moved to respond to users' needs with its introduction of a compiler that will facilitate the testing of PL/1 programs.

The OS PL/1 checkout compiler is said by IBM to reduce the number of runs required before a program is ready for production use by providing more extensive diagnostics and checking aids.

The compiler is designed, IBM said, to help programmers speed the writing and testing of PL/1 programs in both time-sharing and batch processing environments. Minimum configurations would require a 360/50 for time-sharing and a 360/40 for batch processing.

Intended for use in larger installations, the compiler requires at least 100K bytes of main storage. A related subroutine library, the OS/PL/1 transient library, is also required. The compiler will run under OS on IBM 360 and 370 systems.

Pinpoints Errors

The new diagnostic information is provided during the program testing. It pinpoints errors by statement number and prints messages in full or short form at the user's option.

The checking aids consist of a continuous record of program branches and statements which allow the tracing of logic paths taken by the program during execution. The trace can be turned on or off by the user during testing, IBM said.

In conjunction with the recently announced Time-Sharing Option (TSO) program, the checkout compiler allows monitoring of PL/1 programs from remote terminals during program development. Programmers at terminals can make corrections as problems occur during execution.

The OS PL/1 checkout compiler can also be used independently to develop and run a fully debugged program

When used with the OS PL/1 optimizing compiler, the new package will enable programmers to obtain fast execution of debugged segments as they run with other parts of the program being tested. The optimizing compiler is said to provide significant enhancements in speed of execution. Both compilers are said by IBM to feature major improvements to the PL/1 F-level language and inter-language communication with Fortran and Cobol modules.

Initial user reaction seems to be favorable. Among several PL/1 users contacted by CW, one said that his installation has needed the facility to do PL/1 debugging over remote terminals for some time and this compiler should solve the problem. The additional diagnostic capability did not seem to impress users. Most said that PL/1 currently had the best diagnostics available with any language and therefore any additional capability would tend to be superfluous.

The only negative comments were those of a user who was concerned about the possible overhead cost entailed in using the system. The high core requirements and potentially long running times might outweigh the advantages gained from the new features for a batch installation, he said.

The checkout compiler is scheduled to be available in November 1971 at $340/mo. The PL/1 transient library will be available at $25/mo. The optimizing compiler is scheduled for September 1971 at $250/mo. The packages will be made available under the usual license agreement by IBM.

California Bill Calls for Centralized EDP Department

By Phyllis Huggins
CW West Coast Bureau

SACRAMENTO, Calif. – California has attacked soaring EDP costs on two fronts.

The state Office of Management Services under Charles P. Smith has been credited with saving the state Government about $15 million in the past three years by working for efficient EDP operation in state departments.

Sen. Stephen P. Teale (D-West Point) has presented a bill to centralize all state computer operations, except for the University of Calif. and the state colleges, under the jurisdiction of one department.

Teale said his bill could save taxpayers at least $4 million a year by eliminating empire building and promising consolidation of computer facilities between different agencies.

The bill, SB724, passed the senate 31-2 and is now headed for the assembly. Insiders say that even if it passes the assembly it will be vetoed by Gov. Ronald Reagan as it is considered too drastic.

The bill would provide what Teale calls "a chief fink" to ride herd on the many computer centers that now absorb about $67 million of the state's budget for salaries, equipment and operating costs.

Teale said many centers are being run at 17% of efficiency while others are going at 100%. One member of Teale's Senate Finance Committee, Randolph Collier, (D-Siskiyou County) said: "Having your own computer is like having a carpet on the floor. It's a status symbol."

The establishment of a department of data processing operations is expected to eliminate quarreling between such organizations as the department of motor vehicles and the department of highway patrol regarding jurisdiction of data and computers.

Should the bill be vetoed as expected, continued work toward a centralized EDP department is expected to be done by the EDP policy committee headed by Lt. Gov. Ed Reinecke. It is the reports of this committee that have in part contributed to the current bill.

Excluding higher education, there are now 48 autonomous computer centers in Calif. state government, all operating without any coordinated or long-range planning. It is felt that a professional approach to computer facilities management will occur when one department is responsible for effective and efficient operation of electronic computers.

Correction

Scientific Measurements, Inc., not Systems Measurements, is the maker of the new hobby/training device, Comp-U-Kit, as reported in the Aug. 12 issue. Its address is 9701 No. Kenton, Skokie, Ill.

MEMORANDUM

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FROM: Glen Barry, Pres.
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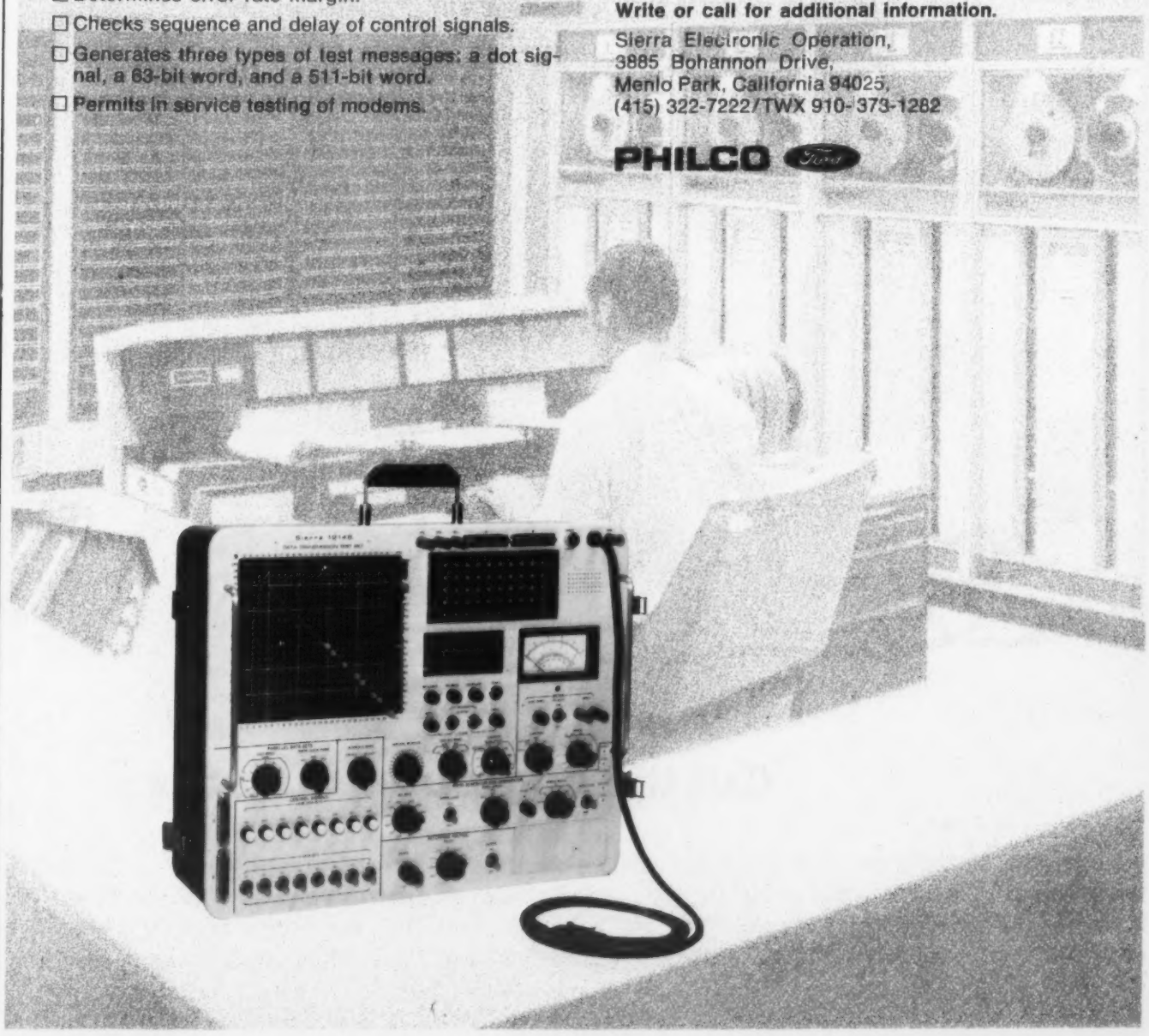

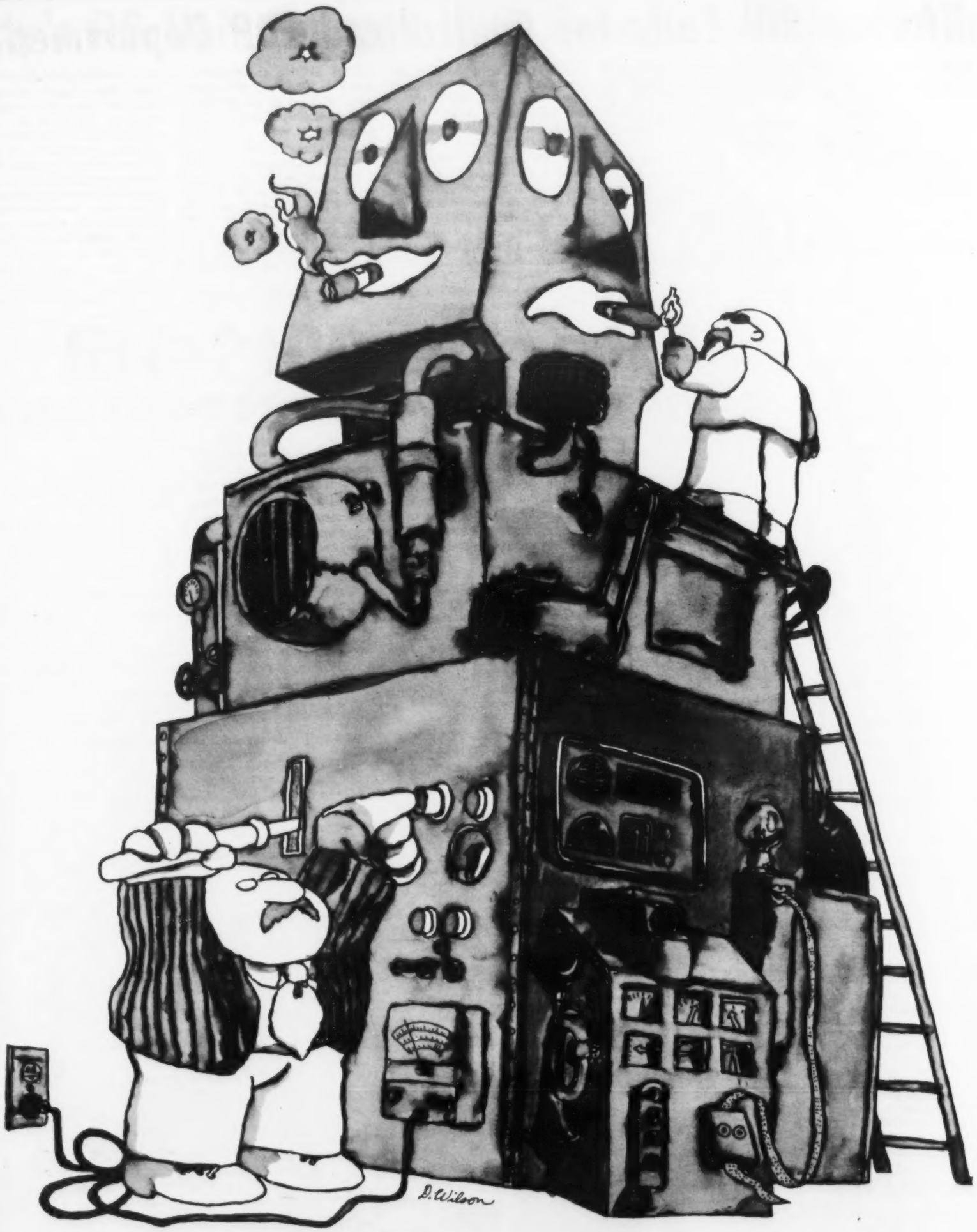

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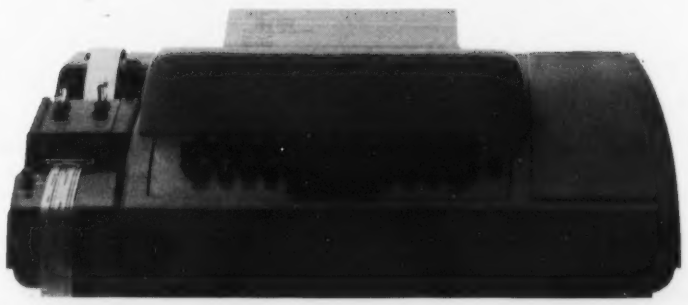

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Viewer Participates

'Software' Show Stresses Art/Technology Interaction

NEW YORK – *Software*, an exhibition concerning the fastest growing technology in our culture – information processing systems and how they affect us – will be seen at The Jewish Museum from Sept. 17-Nov. 8. Thereafter it will be at The Smithsonian Institution, Washington, D.C., from Dec. 16-Feb. 14.

The exhibition, initiated by The Jewish Museum and made possible by a grant from American Motors, was organized by Jack Burnham, author of *Beyond Modern Sculpture* and professor of art at Northwestern University.

Software, says Burnham, "makes none of the usual qualitative distinctions between art and technology. Rather it defines technology as a pervasive environment altering our consciousness vastly more than art. At a time when aesthetic insight must become a part of technological decision-making, such art/technology divisions seem nonsensical."

Hardware

Some of the "hardware" employed by the 22 artists in the show includes time-sharing computers, teletypewriter equipment, solar-powered radios, high-speed copying machines, radio transmitters, closed circuit televison, and 40 furry gerbils. Several of the artists, through documentation and art proposals, have produced purely conceptual works.

Many of the works in the exhibition call for participation of the viewer.

For example, visitors to the museum can browse on video terminals through an annotated multidimensional catalog of the show, called a "hypertext." If at any point the reader of the hypertext wants further information about a piece in the exhibition, an artist, or the definition of a word, he can request such information and it will appear on the display screen.

On leaving the show each reader will get his own personalized computer printout of what he has read. As each participant will probably ask for different information, each printout should be unique.

The visitor to *Software* will in the above case be interacting with Labyrinth, a DEC PDP-8 computer with nine terminals, programmed by Art and Technology, Inc. of Boston.

Emanating from Labyrinth will be three additional activities, one of which is by Hans Haacke. Haacke's program will develop a Visitor's Profile of the show through a series of fact and opinion-seeking questions to be answered by viewers who type a response on a Teletype keyboard.

The answers will result in a profile of *Software* visitors giving such data as: out of 12,000 museum goers there have been 199 married women who are atheists, or 7,000 college educated women who are against the war in Vietnam. The continuously changing statistics will be projected on a large display screen.

In a piece called *Seek*, Nicholas Negroponte and his Architecture Machine Group at MIT are trying to discover whether the animals called gerbils can tell architects and urban planners how humans react and adjust to a changing environment. What the spectator will see is 40 furry gerbils moving around and disarranging 2,000 plastic cubes, at the same time that a mechanical grappler is rearranging the cubes to wall the animals in.

The visitor can rent a small transistor radio and pick up continuous poetry readings being broadcast within the museum in a work assembled by Giorno Poetry Systems. Dozens of poets will be represented, with a different group narrating each day. Some of those included are Allen Ginsberg, William Burroughs, Frank O'Hara, Aram Saroyan and Peter Schjeldahl.

Blind persons can learn to "see" through the skin of their backs with the Vision Substitution System developed by the Smith-Kettlewell Institute of Visual Sciences. The blindfolded spectator will be able to test this system by sitting in a special chair and pressing his back against 400 plastic-tipped vibrators which receive electronic impulses through images transmitted by a television camera. In effect, the camera is a substitute for the lens of the eye and the skin of the back replaces the retina.

For the last six months Van Schley has been filming five three to five minute sequences in color and sound of many of the artists in *Software* talking about their work and what *Software* means to them. One sequence is devoted to Schley's filming of the luncheon meeting of the artists with Jewish Museum and Smithsonian staff, and the press, about the concepts and philosophy of the show.

Smithsonian Accepts 'Compulogical Tutor'

NEW YORK – A reception room in the National Museum of History and Technology in Washington, D.C., was the scene recently of a rare ceremony in which a Utica College professor's unusual invention became a part of the nation's scientific history.

Joseph J. Bialek, associate professor in accounting at Utica College of Syracuse University, Utica, N.Y., presented his "Compulogical Tutor," a computer training device, to officials of the National Museum of History and Technology, a part of the Smithsonian Institution.

Accepting the Compulogical Tutor for the museum were Dr. Uta C. Merzbach, curator of mathematical instruments, and Dr. Silvio A. Bedini, assistant director of the museum. Also present were U.S. Rep. Alexander Pirnie (R-N.Y.), members of Bialek's family, and executives of the company that manufactures the computer.

In accepting the presentation, Merzbach, a prominent figure in the mathematics field, said: "In itself, Prof. Bialek's computer is an important representation of the fast-moving technology of the mid-20th century. It is particularly useful in demonstrating the principles and logic inherent in the other historic machines in the museum."

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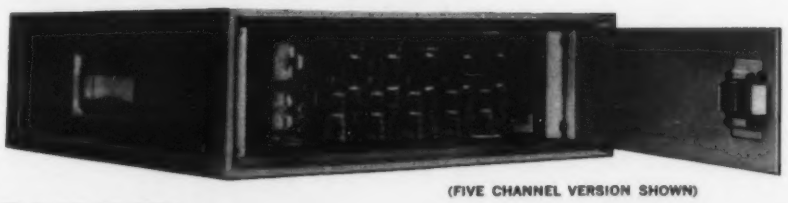

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Editorials

Be Prepared

There is a specter of catastrophe waiting in the wings for every DP manager.

His computer room may be safeguarded against earthquakes, tidal waves, and sabotage. Yet, unless today's DP manager closely examines the total data processing environment, he is courting some very real, very expensive dangers.

Overlooking such needs as good software documentation, adequate backup power, or the design of meaningful controls and audit trails, could result in calamities just as serious as a computer room bombing.

It is no longer sufficient to protect only against obvious risks. DP managers must continuously weigh the costs of delayed processing against the costs to prevent delays.

Spending more money on protection is a delicate decision to make.

This week, in its "1970 Environment and Security Supplement," CW takes a close-up look at the dangers to hardware and software operations.

The report concentrates on the smaller and more probable risks a DP manager incurs all day long.

It makes sense to look at first things first.

Letters to the Editor

Comments on 3211 And 1403 Printers

Reference is made to the July 8 issue of *Computerworld* in which you discuss the new peripherals available for the IBM System/370. Specifically I was very disappointed to see the comparison which you made concerning the 3211 printer: "The 3211 impact printer operates about twice as fast as the previous IBM printers at 2,000 lines per minute at triple the price."

The correct facts are that the 3211 printer which includes a print train cartridge and universal character set adapter rents for $2,000 per month. The 1403 printer with print train cartridge, control unit, and universal character adapter rents for $1,672. Therefore, as you can see, the 3211 printer is twice as fast at less than twice the price.

Michael D. Snyder
Technical Consultant

Josten's
Owatonna, Minn.

IBM reaffirms that the rental for the 3211 will be $2,800/mo, not $2,000. But you are right that we erred when we compared this to the basic $875 rental for a 1403 N1 printer. A complete 1403 N1 printer rents for $1,672. Ed.

Owner Relates Tale Of $14.98 Computer

You see, I bought this computer at a Parke-Bernet auction recently for $14.98, and I set it up in my apartment so I could figure out how long I should let the stuff ferment, but when I turned it on nothing happened.

A couple lights blinked, but that was all. The thing wouldn't even hum. Nothing spun around like it should and there wasn't any tape coming out of its mouth, and a couple of my bottles looked like they were ready to go.

So I went looking through the back and I found this instruction manual stuck in the wires to catch a battery leak, I guess, and I figured that if I read it maybe I could get the darn thing to do something. I never saw such a mess of garbage in my life.

I even called the U.N., but they never heard of a country that speaks Fortran. I brought a guy in from next door to see what he could do with it, but we got to talking and tasting and I wound up having to carry him out on the fire escape and throw him in his bedroom window.

So here I am with broken glass all over the place and the guy downstairs complaining about the stuff coming through the ceiling and four drunken dogs lapping it up in the hallway and this stupid machine and the stupid manual.

My question is, did I get gypped?

Joseph T. Rigo

New York City

'I Thought This Conference Was Supposed to Help Mankind!'

D.C. Data-Line

One Man's Nightmare With Misbillings

By Alan Drattell
CW Washington Bureau

WASHINGTON, D.C. – When Sen. William Proxmire (D-Wis.) introduced his bill to protect consumers against careless and erroneous computerized billing [CW, Aug. 12], he took issue with companies who proudly proclaim that they have little error in their computerized operation.

Any amount of error, said the senator, would be too much. Over 50 million people a year buy on credit in the U.S., he said, so that an error rate of 0.1% would mean 50,000 errors a year.

'A Nightmare'

"A computer misbilling can turn into an unbelievable nightmare of past due notices, calls from collection agencies . . . and threats of bad credit ratings," Proxmire declared.

In testimony before the National Commission on Consumer Affairs, Proxmire told the story of James Kurtz, a member of a law firm who spent a year and a half trying to correct an erroneous charge from the Diners Club. "This experience, which bears a close resemblence to a Kafka novel, is by no means untypical," Proxmire warned.

When It Began

The brouhaha started Nov. 15, 1968 when Kurtz received a statement from Diners Club with a charge for $207 for an airline ticket that he had never purchased. Kurtz paid the total bill, less the $207 and notified Diners by letter on Dec. 4 of the error.

His December bill, however, compounded the error by adding still another extra $207 charge. On Jan. 3, 1969, Kurtz received a computerized notice that his account was overdue. Ten days later he wrote a second letter to Diners concerning the $414 erroneous billing.

On Jan. 16 he received a telegram asking him to contact the Club's collection department. This was followed immediately by another form notice advising him to deduct the amount in question until he heard from Diners. In a telephone call and a confirming letter Kurtz told Diners he was paying all but the amount in question on his December bill and Diners agreed this was satisfactory.

However, the January bill arrived and showed a third extra airline charge of $207 – compounding the error to $621. And Kurtz wrote again to Diners.

Cancellation Threatened

The Club responded with a form letter thanking Kurtz for his payments but warning him that his card might be canceled if he did not pay the full bill.

Immediately, the lawyer placed a collect call to Diners. The gentleman who accepted it offered sympathy and agreed to straighten the matter out as soon as possible. But the call was followed by another past due notice.

The February bill came, but to Kurtz's surprise it was only $414 in error. And once again he wrote a letter to the credit card company detailing the error. He received another past due notice.

Several weeks later a "pay up or else" notice came in the mail, and Kurtz responded with another letter of explanation.

Finally, on May 2, 1969, Diners sent a letter to Kurtz saying the Club was checking with Braniff and American Airlines to find out who was responsible for the erroneous billing.

A little over a month later Braniff sent Kurtz a letter affirming that the billings he had received were in error. A copy of this letter was sent to Diners and Kurtz himself sent a letter to Diners just to make sure they understood the Braniff position.

However, when Diners gave Kurtz a credit on his account they only did so to cover one of the remaining two $207 charges – thus he was still billed $207 in error.

The lawyer enclosed a copy of all previous correspondence in a letter to Diners. But the Club called Kurtz's wife and explained that the lawyer did indeed owe the remaining $207. Furious, Kurtz once again sent copies of all previous correspondence to Diners.

This time, however, Diners did not respond.

Getting desperate, Kurtz decided to call Braniff, which confirmed in that call and in a subsequent letter to Diners that the mistake was not Kurtz's and that a disagreement between Braniff and American over the ticket charges had been settled. That letter from Braniff to the credit card company was dated Nov. 18, 1969 – one year after the original error.

Finally, on May 22, 1970, Kurtz, after writing several congressmen, received a letter from Diners apologizing and explaining that a credit would be issued for the remaining $207 error and the $66 service charge that had accrued on that error.

According to Mark Bollman, executive vice-president of Diners, the company is trying to service its customers more effectively. "We've regionalized our customer service centers," he said. "Where we only had two operating in the U.S. before, in New York and Los Angeles, we now have four. Miami covers the Southeast, Denver the Mountain and Central, New York and Northeast and Los Angeles the Pacific."

As Proxmire said before the National Commission on Consumer Affairs, some of the responsibility for computer mistakes should be shifted where it rightfully belongs – "with the credit card companies."

The Taylor Report

How Accounting Arrangements Should Be Best Utilized

By Alan Taylor

In a recent article, [CW, Aug. 12] the types of applications running on a computer system were broken down into "Major" ones, for which the computer was purchased; "Minor" ones, for which there is a demand to use any spare capacity available on the existing computer; and for 'Make-Work' ones, which allow programmers and operators to be more or less usefully occupied even though there is not any necessary value to the firm in their output.

It was noted that for each category of work different costing arrangements were accountingly proper. This article deals with how the accounting arrangements should best be utilized.

The accounting differences that we discovered to exist between the three types of programs are summarized in the chart. This shows that while a major program must pay its share of the costs of the hardware, and a minor program must bear its running costs, a Make-Work program need not have any cost applied to it at all!

The chart also shows that the maximum cost for the Minor and Make-Work applications is the cost of doing the same amount of work outside the computer.

Wide Range

These can be quite wide ranges. A sales analysis, for instance, may apparently only cost $500/month but to take it and have it done outside could easily cost $5,000. What then cost should be applied to running the sales analysis? $500? $1,000? $2,000? $5,000? Who knows? Any of them are valid from an accounting point of view.

As often happens in such questions the clue to the answer is hidden right in the question. It was in the verb "should." "Should" implies that there is a judgment factor here.

From a computer technical point of view, or from an accounting point of view, no objection can be rigidly raised to any particular cost that falls within the $500 to $5,000 range. The technical contribution is simply to check the validity of the final answer. To get the answer, though, he must go back to basics, and consider what the objectives of costing are.

Costing is not actually done for its own sake. It is not just data collection. It is done so as to provide a management tool. It is done particularly so as to provide management control of the efficiency of department operation and to align the interests of the department with the interests of the corporation.

Let us consider then what would happen in the case of a maximum cost or a minimum cost being used for two such applications. Let us say that payroll is a Minor application, and that Sales Analysis-By-Product-Line is a Make-Work application at a particular installation.

These are quite reasonable categories. Everyone knows that payroll has to be done and that there is a cost associated. As such, a computer department can reasonably expect to pick this one application up if there is spare capacity and to be paid accordingly, even though the system was obtained to optimize warehousing costs.

Sales analysis, by contrast, is only useful if the particular salesman or sales manager finds it is useful. There is no intrinsic value in it. If it allows him to do his function better, then it is worth something and may even become later a major application.

But in the meantime, until he is familiar with it and knows how to use it, it does not have any particular value. I know that a lot of programmers and computer people are convinced that any analysis has an absolute value. But this simply is not so. Not in the real world.

The real value of producing it lies in the fact that we will find out whether it has some value or not! We will find it out by watching the sales managers use of it. This then is the benefit gained from its production. If it is of use, then the computer department will gain a customer. If it is no good, it will gain some education.

This example underlines that, so far as Make-Works are concerned, the computer department directly benefits. In fact, it does in all cases – see the chart.

The key items are to be looked for by the computer department manager shown in the right-hand side. Here it can be seen that, where a minimum cost is used, then the computer department does not get any credit and the using department basks in an unearned reduction in costs. This tends to hurt the computer department – and through it the firm.

Equally, where in maximum cost is used, the opposite applies. There is then no incentive for the user department to use the computer as it is no better for it than anything that it can do itself or have done outside. Yet if it does use it the computer department is basking in a large profit for each group of work done.

I think that it is fairly clear that, in an optimum solution, the user departments should be encouraged to give work to the computer department and the computer department should be encouraged to do work for them. Clearly neither the maximum nor the minimum provide this. Therefore some intermediate value should be used, which answers our original question.

Settling Values

There are many ways of doing it, of course. One way would be just to split it half-way down the middle. There are others, the use of machine time as a measure of risks that the machine time charges are outside the ranges that are applicable. The way that I personally recommend is that for the particular application the maximum and minimum figures are discovered and a negotiated figure is arrived.

This introduces, and is the concept of a "standard cost" for computer application. This is a normal item outside computer installations but it does mean that a decision has got to be made ahead of time by managerial negotiation as to what that figure should be.

It is not anything that can be decided by the accountant. He can merely say what the ranges are in which a valid figure can be placed. Nor is it a figure that can be decided by the programmer of an application. He can merely identify what runs and what speeds he can expect and what peripherals he will use in the performing of the application.

Nor is it a decision that can be made by the operations manager. He can merely say how many hours of time it utilizes, etc. It is one which only management can make in the light of all the factors from these three items.

If management fails to make such decisions and fails to insist on receiving input from the various areas that will allow such decisions to be made, then the efficiency of an installation will not be under control. It may happen to be good, or it may be bad, but the efficiency will not be under control, the credit will not be properly divided, and the reason for its lack of control will be directly in management's failure to act.

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Work Type	Minimum Charge	Maximum Charge	Who Is Encouraged to Work Hard When the Charges Are Set at: Minimum?	Intermediate?	Maximum?
Major	Full share of hardware costs split between Major Users.	Market cost of work, if higher.	Only the Major user.	Both the Major user and the computer department if market value higher.	Only the computer dept.
Minor	Full payment for all operational costs.	Market cost of work, if higher.	Only the Minor user.	Both the Minor user and the department directly; Major users indirectly. It could help them negotiate a lower computer charge.	Only the computer dept.
Make-Work			The computer dept.; which has the chance of showing its unappreciated value.	Potentially all Major users; as it indicates that a real application may soon start making real cash contributions to computer costs.	Only the computer dept.

This is the possible range of acceptable charges for various types of computer applications. Note in particular that all basic costs must be taken by the Major applications; and that the key advantage to handling Make-Work applications is that they can be used to sell management on real, but unappreciated values that can be obtained from their computer systems.

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Committed to Change

The Discontent of Programmers

By Joan M. Straub
Special to Computerworld

The role of programmer may be unique in white collar occupations. The programmer is committed to constant change in order to maintain his status. This change also includes constant technological change that he may not be able to respond to because of the lack of formal retraining in the field.

The programmer's work is often not subject to evaluative judgments other than whether it "runs." Lack of consistent evaluative judgments result in self-evaluation which may reflect unrealistic standards. Once a job is successfully running the programmer has no further contact with it unless problems develop.

The programmer works under constant pressure for which he feels there is no recognition by management. The programmer's means of self-aggrandizement is through job-hopping and this tendency for job-hopping is a classic indication of worker alienation.

Viewpoint

Studies of the processes of automation reveal the job-related pressures on EDP personnel. Involved in the stress and anxiety brought to bear on the EDP staff is the feeling that key members of management are making unrealistic demands and do not understand the amount and nature of the work involved.

Love of Change

Programmers come to have a vested interest in change, for both the importance and the interest of their work is in designing and testing programs for a new system. This innovative function suggests that programmers regard their role as essentially creative. The meaning of employee initiation of innovation in an organization has been observed in industrial sociology.

The initial elaborative phases are periods during which personnel are willing to put in a great deal of work which they perform with pride. As day-to-day activity replaces innovation, feelings of anticlimax are often expressed while morale drops. This commitment to innovation and change, while of central importance to efficient programming, is probably one of the basic causes of programmer discontent.

While information concerning programmer expectations implies that they perceive their work role as being innovative-creative, there are also indications that the programmer regards himself as a technical expert.

This self-image as an expert is enhanced by the fact that, although superficial knowledge of computer technology has entered the public domain, a comparatively small population has achieved technical expertise.

In contrast to the programmer's self-image is the fact that the major volume of EDP departments utilize the computer for relatively unsophisticated uses. Consequently, the programmer cannot perform a role that is relevant to his self-concept.

As a result, and in addition to other strains inherent in the occupation, there appears to be widespread dissatisfaction with the conformity of the job to the programmer's expectations.

A concrete indication of the disparity between self-expectations and job requirements is the unusually high rate of turnover experienced by EDP departments.

The most obvious explanation for the high job turnovers is a favorable job market. However, literature concerning factors associated with high turnover rates indicates that irrespective of alternative employment opportunities, employee motivation to leave an organization suggests that the primary factor influencing this motivation is employee satisfaction with the job as defined by him. Dissatisfaction arises from a disparity between reality and the ideal held by the individual.

Although the programmer has secondary control over the work process in terms of freedom to choose the techniques and methods of accomplishing a task, he lacks primary control over the type of work proposed.

Because of the shortage of personnel equipped, trained, and competent to perform within the specialized body of knowledge required by programming, and the programmer's monopoly over this body of knowledge, the programmer may feel that he is potentially more powerful with respect to his job than he actually is. This disparity leads to discontent with his immediate situation.

Job Leaving

An additional factor in job leaving, partly due to the programmer's commitment to change, and in part to the outcome of changing organizational structures, is lack of strong commitment to the organization – which facilitates the breaking of employment bonds.

Also worthy of consideration is the matter of pressure involved in the occupation. Going to a new position might function as a method of alleviating pressure for a time.

While noncollege programmers exhibit lower rates of turnover than do the more educated group, this is probably not a direct relation to greater job

(Continued on Page 14)

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Why Are Programmers Dissatisfied?

(Continued from Page 12)

commitment but a reflection of opportunities and additional factors related to life-style and age level to mention a few.

It is quite probable that additional research would reveal that noncollege programmers have developed other means of expressing their frustration, in addition to job leaving.

In terms of low commitment to the total organization and high involvement with innovative change, the situation of the programmer is most like that of the engineer. As the profession stabilizes, a process that is being aided by more professional training, a role should emerge for professional associations. The growth of professional associations would act as a stabilizing force in aiding commitment of the individual programmer to his work role and to his departmental associates.

Technical staff employees are not in sociological literature for their low level of commitment to parent organizations. However, in other technical professions, such as engineering, the professional organization has achieved a certain amount of job-involvement and stability by functioning as a factor to commit the professional to job-related goals and to involvement with his fellow technicians.

It is just this type of associational function that has been lacking in EDP. Many personnel problems have been the result of the fragmentation of the work force into personnel committed only to their own individual goals.

Stabilizing Factors

The growth of the profession over time must also see the development of stabilizing factors beside professional associations. Formal programs of continuing training and retraining in new computer technology, open fairly to the staff on the basis of merit, will also enhance the programmer's image as a stable professional.

Other professions, such as engineering, have already undergone the evolution which EDP is now beginning. If these older professions are an example, an upcoming development will be the appearance throughout the upper echelons of many organizations of management that are EDP trained.

These managers will neither feel threatened by their EDP staff nor feel inclined to view the EDP department as a means to their own personal rise. The development of EDP personnel who will move into management will serve to integrate the EDP mind and presence throughout the organization.

Viewpoint

In order to keep the EDP staff within an organization long enough for these events to materialize, several short-range steps ought to be taken toward reducing the feeling of alienation. Instead of salary increases, which do little to prevent job hopping, cash bonuses for programs completed on schedule might easily help induce the programmer to stick out the project.

One Philadelphia insurance company uses a system of bonuses as an incentive for rapid completion, and efficient programming, of high priority project. In addition, a system of royalties paid each time a program is run would make it worthwhile for the programmer to build up time in an organization.

With systems such as these, personnel will be reluctant to abandon accumulating royalties for working programs (easing the manager's difficulty in maintenance) and reluctant to abandon projects before their completion (eliminating the biggest difficulty in project scheduling).

The present and projected growth of EDP has been compared in social impact to that of the entire industrial revolution and yet comparatively little has been tried to incorporate the necessary personnel into functioning organizational structures.

High salaries alone have not been sufficient to develop a professional role for the programmers and analysts. What is needed in the occupation is the development of concepts that will enhance the self-perceptions of the personnel as recognized professionals in an occupation vital to modern society.

Joan Straub has several years' experience as a programmer/analyst and is currently working toward her PhD. in Sociology at New York University.

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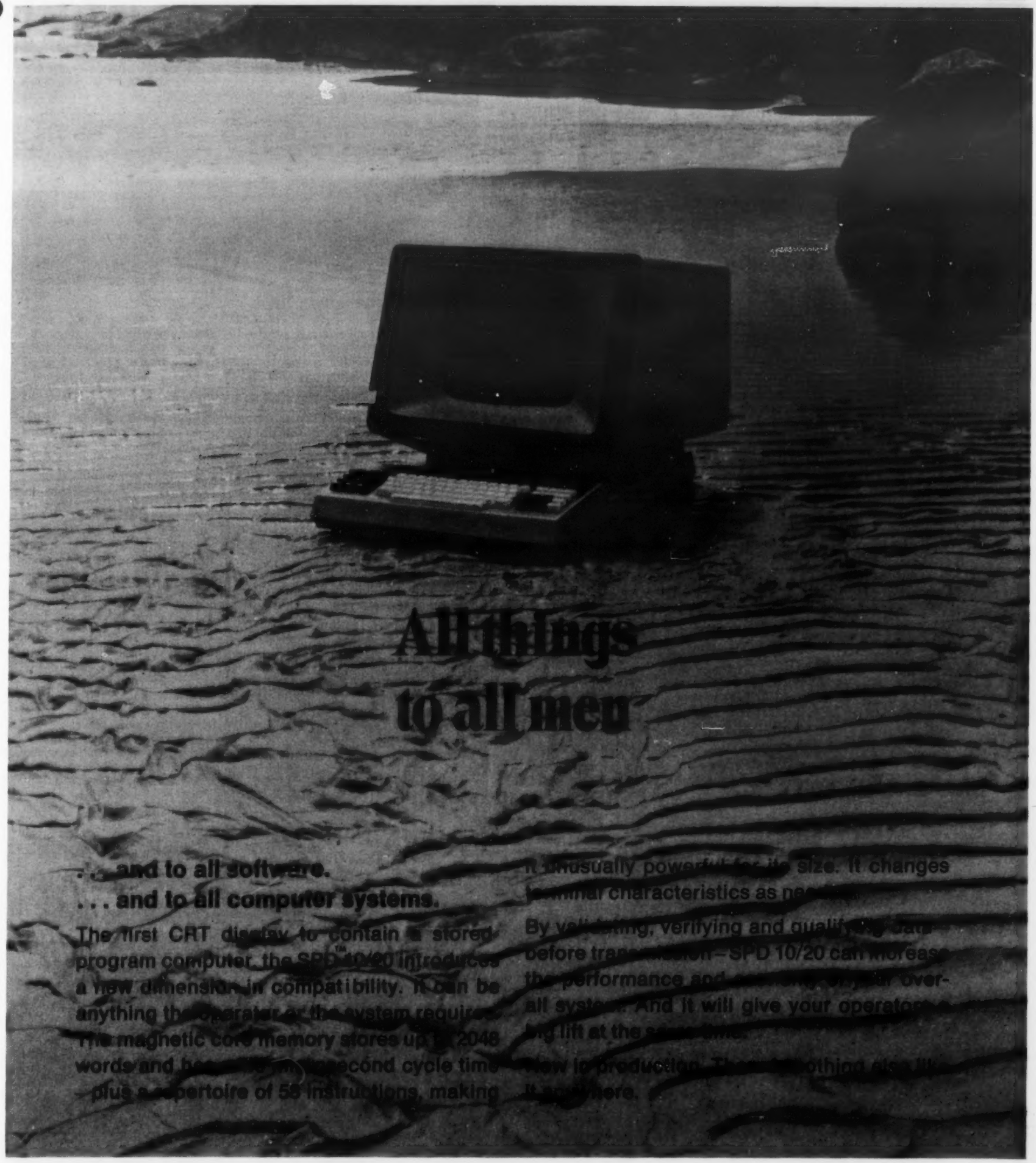

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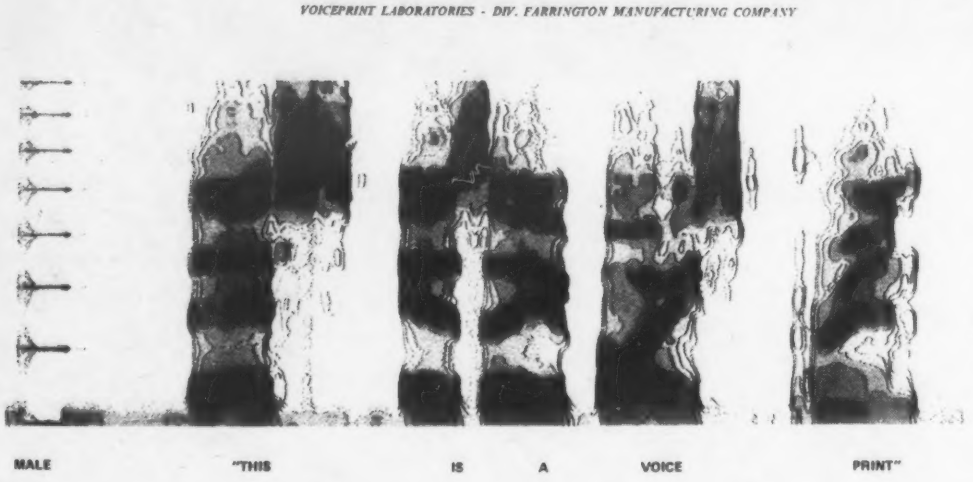
Person's 'Voiceprints' Assure Certain Identification



A Hard-copy Version of a Typical Male 'Voiceprint'

SOMERVILLE, N.J. – Just as crime investigators maintain files containing hundreds of thousands of fingerprints for positive identification purposes, a Varian 620/i general purpose digital minicomputer is storing and comparing voice signatures or "voiceprints" in the development of a new identification system that gives real-time, foolproof verification of a person's identity.

Called the Speaker Recognition System, the new technique is being developed by Voiceprint Laboratories here, a division of Farrington Manufacturing Co.

The mini has an expandable 16K core memory (4,096 to 32,768 words) linked to a Varian 620/85 analog 16-channel multiplexing converter.

Major Features

By storing the major features of a person's spoken acoustic signal in the computer's memory, companies or agencies that require strict security systems or otherwise tightly selected admittance now can instantaneously recognize cleared personnel or visitors.

In the Voiceprint Laboratories' system, a specially designed filter bank separates the speech input signal into its many and complex spectral components. Over standard telephone lines, a frequency range of 200 to 3,000 cycle/sec is covered; the frequency range can be extended by adding more filters and multiplexers.

The features of the speaker's acoustic pattern are digitized by means of the multiplexer analog-to-digital converter. A real-time clock generates accurately timed interrupts for controlling various feature extraction strategies – that is, a user may want to check only one particular segment of a person's voiceprint pattern.

In this instance a signal can be generated to tell the computer to compare only that segment of the total voiceprint to appropriate stored segments in its memory.

With voice signatures stored in its memory, the computer can match any new speech input signal pattern with them. If the new signature compares with one in memory, the person is positively identified, since no two voices are exactly alike and a voice-signature cannot be counterfeited.

New Signals

When more than one of the voice signatures that are prestored in the computer seem to match the voiceprint being identified, serial reduction can be performed by requesting new utterances. The computer can match these new voiceprints as many times as necessary to compare common features and identify a unique set of characteristics.

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Paycheck Foulup Comes on Heels Of Voting Issue

LOS ANGELES – The county registrar of voters probably wishes he had never heard of computers. The multiple foul-ups in the last election have become history as the Votomatic computerized vote count system came unglued at the seams. About the only thing that worked right was the computers – they think.

Now to add irony to agony, 150 of the registrar's own employees went without their paychecks due to a computer foul-up. This is a case of the hero biting the heroine, or at least the protagonists.

Those affected were daily workers, which implies that they were people put on the vote count. The county auditor hastened to assure people that they would be paid shortly as all was being processed manually.

Part of the problem was that there were new surtax figures, and due to late reporting, all people did not get on the payroll in time. The county auditors office stated that the county registrar of voters office was not the only department affected as the situation was partly brought on by new rates for everybody.

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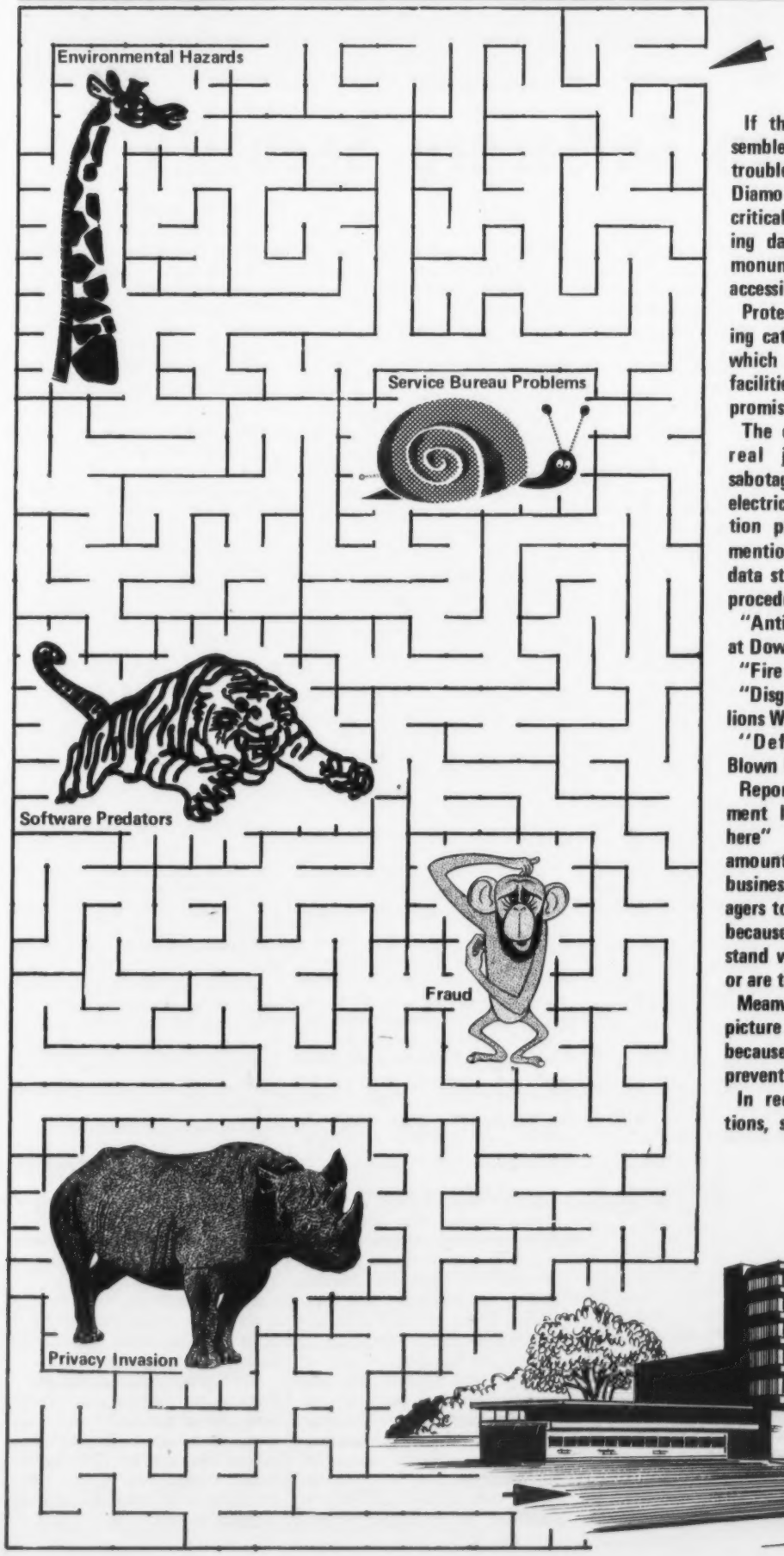
1970 ENVIRONMENT & SECURITY SUPPLEMENT



If the perfect EDP manager were assembled, he'd have Sam Spade's eye for trouble and a willingness to spend like Diamond Jim Brady. These traits are critical to anyone responsible for guarding data resources and protecting that monumental paradox, the accessible "inaccessible" computer room.

Protection here simply means preventing catastrophe, that calamity or disaster which can disrupt or destroy hardware facilities and operations, and/or compromise software files and security.

The computer's environment is a very real jungle, where dangers of riot, sabotage, fire, flood, air conditioning and electrical power failures, and poor location planning constantly prowl, not to mention the lurking evils of inadequate data storage facilities and poor operating procedures.

"Anti-War Demonstrators Destroy Data at Dow Chemical"

"Fire Sweeps Fresno State DP Center"

"Disgruntled Employee Erases $$$ Millions With Two-Bit Magnet"

"Defense Contractor's EDP Center Blown Up"

Reports like these should shake management loose from the "it can't happen here" attitude, along with the right amount of cash to safeguard against business failures. Yet, many EDP managers today are just waiting to be burned because they either don't fully understand what dangers can happen to them, or are too embarrassed to admit it.

Meanwhile, others have the complete picture but will risk a catastrophe simply because of a refusal to spend money to prevent it.

In recent years, several new organizations, specializing in security consulting services, installation of sophisticated electronic protection systems, and total computer room planning, have taken steps to clean up the jungle.

Shielding businesses from victimization by such things as fraud, flood, fire and theft, their recommendations and services may prove expensive. Still the price of protection is small compared to the loss it prevents. EDP management, according to one spokesman for a consulting firm, must be determined to prevent loss by securing vital records and to eliminate waste of valuable time required for re-creating vital data.

The onus is therefore on management to examine the computer's environment, to be aware of temperature, humidity and vandals, to plan for back-up facilities, to update master files, to take tape and disk storage precautions, to insure programs of secure internal control.

Hand-in-hand with these factors is another awareness – the right of human privacy, or as a member of Congress recently said, "recapturing democracy from the computer."

In today's bursting and disorderly environment, such a right may very well be the hardest to maintain. The complexity of our society can justify massive computerization of records and documents, yet there is serious question whether or not it can ask the individual to surrender to a suffocating sense of surveillance represented by insensitive and closed computer/communication systems.

In this supplement CW will be treking over some rather wild terrain. Find your way to total security on the adjacent trail, and perhaps the environment shouldn't scare you. Lose it, and watch out for dangers to your EDP operation.

Software Hazards are not paper tigers! If your EDP operation is not as secure as it might be, it could be victimized by such dangers as operator error, erroneous input, equipment malfunction, computer fraud, sabotage, theft and riot. Photo at right shows what happened to vital records at a Dow Chemical installation when an angry mob struck.

Many Dangers Prey On Software Security

By Richard G. Canning
Special to Computerworld

Editor's note – The increasing trend towards use of computers as remote terminal systems, while at the same time processing batch work in the background mode, parallels the increased sensitivity of the data being stored in on-line files.

Such a relationship, foreseen or not, is unfortunate for it creates a situation of greater access to stored data by unauthorized persons.

Earlier this year, EDP *Analyzer, a monthly publication, reported its findings based on a staff study of the current data security situation for computer systems using remote terminals. The following article by Richard G. Canning, Publisher of* EDP Analyzer, *summarizes these findings.*

Access to stored data by unauthorized persons can occur in three ways: accidental, deliberate-passive, and deliberate-active.

Accidental access might pave the way to later deliberate access; deliberate-passive access occurs from such events as wire tapping, electromagnetic pickup, and observing terminal printouts; and, deliberate-active access occurs when someone deliberately gets around or gets through security safeguards.

While the main concern of our study was the deliberate-active type of threat, the other two types cannot be ignored. For instance, it is not widely recognized just how much electromagnetic radiation is given off by computing equipment.

We were told of a test where a van parked next to an unshielded computer center. In the van was equipment for receiving and processing radiated signals. A high-speed printer, driven by these signals, produced the same output in the van as was printed in the center.

And we came across a mid-1950s study on wire tapping of telephone lines, under conditions where large amounts of money could be involved. Of some 200 checks conducted, taps were found in about 70% of the cases. If enough money is involved, wire taps will occur.

But what of the deliberate-active threat? Dr. Willis Ware of the Rand Corp., and Prof. Edward L. Glaser of Case Western Reserve University, both experts in this subject area, described to us the "how-*not*-to do it" case under the present state of the art.

The first characteristic of such a system is that the software – and particularly the operating system – is so complex that no one person can comprehend it; it is "dirty." Also, the system has a variety of users, with different security privileges. The system has many remote terminals, of different types, and access to a terminal is easy.

Finally, the on-line files hold highly sensitive data. In such an environment, they say, any attempt at data security is doomed from the outset. A skilled penetrator can break in with little difficulty.

A little reflection will show that, unfortunately, the bulk of today's remote terminal systems comes very close to this situation. The data files do not even have to be the ones used with the remote terminal system; as long as they can be accessed by the computer, they are vulnerable.

"Clean Software"

What does it take for a secure system? The software must be "clean" – well designed, so that a person can comprehend and verify it for logical consistency and completeness.

The security system should be designed as a part of the system, not added as an afterthought. There should be a relatively small number of authorized on-line users, each of whom has been given a security clearance. Access to all terminals should be strictly controlled.

All components should be checked for electromagnetic radiation and shielding employed where necessary. If sensitive data is to be transmitted over telephone lines, then some form of communciations protection (such as encrypting) should be used.

An example of the present forefront of the state of the art in data security is the Adept-50 time-sharing system, developed by System Development Corp. in Santa Monica, Calif. Adept-50 is an operating system designed to operate on a slightly modified IBM 360/50; the modification is to add the Read Protect feature. It has been designed to serve users at remote terminals via the telephone dial network.

Data security features were designed into the system at the outset and are reported in the Proceedings of the 1969 Fall Joint Computer Conference. Even with its many safeguards, some users of Adept-50 feel that they must follow Department of Defense policy – for instance, if top secret data is being processed by any user, then all users currently using the computer, as well as the computer itself, must be in a guarded, shielded room!

Most user data files will not contain such sensitive data that the guarded, shielded room must be employed.

At the other extreme, most of today's remote terminal systems really provide no security at all against skilled penetrators. A good penetrator, perhaps working from his home or office and with the necessary resources at hand, may very well be able to break into almost any of today's systems in a matter of a few minutes.

An Effective System

The situation is not completely bleak; an effective data security system can be designed and implemented in most instances, according to Dr. Ware and Prof. Glaser. Some of the techniques that can be used include access-control mechanisms, design of the operating system for data security, communications protection techniques, well designed restart and recovery procedures, audit trails, integrity checks for the security system – and the use of well known (and seldom practiced in business) general security procedures.

For some reasonable degree of data security, a remote terminal system must be constrained – in the number and types of users, the number and types of terminals, the sensitivity of the data in the files, and such.

The main conclusion that we drew from our study, however, was a warning. If your remote terminal system is typical of the vast majority of such systems today – that is, if (a) it uses conventional hardware without read protect and/or write protect, (b) it uses a manufacturer-supplied operating system, "so complex that one person cannot comprehend it," (c) it uses a variety of regular terminals, either typewriter-like or CRT, (d) the terminals are scattered over a wide geographical area, and (e) communications are via common carrier circuits, either leased or dial network, then *do not put any highly sensitive data on-line to the computer* – even if such files "are not supposed to be" accessible by the remote terminals – or accept the risk that the data may be divulged to unauthorized individuals.

If your system uses remote terminals, the chances are probably better than nine out of 10 that this warning applies to you!

Richard G. Canning is president of Canning Publications, Inc., Vista, California, and is publisher of EDP Analyzer. *He is secretary of the American Federation of Information Processing Societies.*

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Check List for Software Security

Historically, the biggest threat to software security has been the "industrial spy." Seeking valuable targets of engineering data, customer lists, personnel information, financial data, sales and market analyses, and proprietary programs such as an advanced engineering analysis technique, this covert creature continues to be a thorn in the side of every concerned EDP manager.

Yet, his is not the only threat to software. Operator error, program bugs, equipment malfunction, carelessly discarded printout material, faulty operating procedures, all contribute heavily to the misplacement or total destruction of data.

The check list below raises some important questions.

- ☐ Is a copy of the "latest" version kept by the programmer only?
- ☐ Who approves changes to operating programs?
- ☐ Can programmers make changes to operating programs without knowledge of the user?
- ☐ Is there an official list of operational programs?
- ☐ Can users audit the processing of reports received?
- ☐ Do user departments have total control over data submitted?
- ☐ Are rerun procedures clearly established?
- ☐ Can operators rerun programs without authorization?
- ☐ Are control totals on master files maintained by users?
- ☐ Do user departments provide input control totals?
- ☐ Is there a procedure for performance acceptance prior to systems going live?
- ☐ How many copies are there of each master file, off site?
- ☐ Are operating procedures designed to "fail safe?"
- ☐ Could system handle double the volume of input? Could master files double in volume?
- ☐ Is it possible to process master files out of sequence?
- ☐ Can any operator run any program?
- ☐ Are disk files copied after each run?
- ☐ How is conversion from source documents to input data controlled?
- ☐ How are new programs tested?
- ☐ Are functions properly separated to protect against fraud?

New Access Control System by Card Key

A new Securiti-Log Reader/Recorder on-line access Control Systems has been introduced by Card Key Systems, Chatsworth, Calif. to provide maximum security control in areas with multiple-access points.

The system records card number, reader number, status of card (valid or void), date and time. If the Card Key is valid, access controls are operated to permit ingress or egress. Each Recorder is capable of accepting 29 card readers.

Are you sticking your neck out when it comes to facilities protection? A catastrophe like the Pentagon EDP Center fire (below) could happen.

How Vulnerable Are You?

Disaster Prevention in the Computer Room

By Don Strong
Supplements Editor

Leaving a computer center unprotected, like not wearing automobile seat belts, can be deadly serious business.

A growing concern exists today among top management over the vulnerability of their corporate operations. With each new report of a computer room bombing or tape storage facility fire, anxieties increase, until, hopefully, someone finally decides to fortify his operation.

Business, industry, government, schools and research groups have become more and more dependent upon electronic computing equipment to process large amounts of statistical, problematical, or experimental information; to design equipment; and to keep tabs on the host of functions associated with any enterprise today.

Delays in the processing, no matter how brief, cannot be ignored. Money and time lost from an operation that goes down for only a few minutes are still as irretrievable as an empty airline seat.

Acceptance of the premise that computers are now an integral part of daily operations requires an awareness of several dangers, each of which could deliver a knockout blow to businesses or cause heavy and costly damages.

According to Robert V. Jacobson, president of Bradford Associates, Inc., a Massachusetts-based security consulting firm, such processing delays can be grouped in four categories: hardware failures, accidents, human acts, and environmental effects.

Location Planning

A good building design first of all, Jacobson said, can do much to prevent delays and reduce potential hazards, although it is not a total cure-all.

The ideal situation, he added, would be to have a computer system housed in a fire-resistant building without any traces of high temperatures, inflammable or corrosive materials, heavy or vibrating machinery, and where steam, gas or water pipes and ventilating ducts did not pass over the computer area.

"It is not uncommon," Jacobson said, "to find a hung ceiling in the computer room concealing a water pipe passing through an oversized hole to the floor below. Should that pipe ever burst, water would flow freely into the computer room."

Outside Hazards

The computer room should also be isolated from outside hazards, he said. "It just doesn't make much sense to locate a computer system behind big plate glass windows at the sidewalk of a busy downtown street.

"The novelty of computers, I believe, has worn off sufficiently, so it simply isn't worth the risk of exposing the facility and expensive equipment to outside dangers."

Jacobson suggests upper floor interior locations as better choices. "Here they are not as susceptible to angry rioters or runaway vehicles."

Describing other vital location planning considerations, Jacobson noted: "It would be a foolish and truly explosive situation to build a facility next to neighbors like a chemical plant, or beside an airport runway, where some computers have been affected by air surveillance radars causing faulty operation or garbled data passing."

Meanwhile, a spokesman for Data Processing Security, Inc., Hinsdale, Illinois, another firm specializing in security consulting services, sees the availability of employee transportation as a big location planning factor, since "many computer centers operate 24 hours a day, seven days a week."

If computer operations go beyond first shifts, he said, it is also necessary to consider the safety of personnel at night, women in particular.

Building maintenance, too, plays a role in minimizing delays to data processing operations. According to one Midwest service bureau, computer rooms should reflect good housekeeping habits such as mending roof leaks and removing trash.

Neglecting potential hazards could produce disastrous results, as one New England company can affirm. The organization suffered a $127,000 loss when oily lint in a window air conditioner caught fire and opened one sprinkler in a third-story standards room.

The sprinkler quickly extinguished the fire but wet down several computers and and other electronic equipment.

Air Conditioning

Air conditioning failures or malfunctions may not always have immediate or conclusive effects, as, for example, would a power failure. However, a well-designed and maintained system will definitely improve computer system reliability.

The computer room must have a controlled environment. There must be enough balanced air conditioning to control temperature within narrow limits under a wide range of climate conditions.

Similarly, humidity must be closely controlled. It is particularly important for third generation equipment to have this control, because low humidity can cause static electricity which in turn adversely affects magnetic recordings.

Controlling temperature and humidity, however, can be "unbelievably simple or nearly impossible," according to one disk drive manufacturer.

"They are a major influence on the interchangeability of disks, cartridges, and data cells among drives, and are prime constraints to overall system performance."

The manufacturer said that extreme temperatures affect the performance of rotating memories mechanically as well as electrically. Frigid environments reduce the effectiveness of lubricants, contract dissimilar materials, and cause wire insulation to become inflexible. High temperatures are said to cause electronic components to perform erratically and can melt insulating agents.

As general practices, it is suggested that humidity be maintained at a level not permitting condensation and static electricity, while temperature control is best handled by dissipating heat rather than raising the operating temperature of the unit.

The Right Equipment

Before implementing air conditioning units, EDP management must realize that high quality units must be installed. Office air conditioners are not generally recommended for use in the computer area.

Lee M. Kennedy, vice-president of J.H. Driscoll Co., a large New England builder of complete computer sites, recommended separating air conditioning equipment from building systems, "basically because the computer system air conditioning must run during the normal operation, a full 12 months a year, while comfort conditioners generally operate only during hot weather months."

Kennedy noted that periodical failures of cooling tower or water type equipment, and water power supplies from surrounding communities, "could trigger a downage or outage of air conditioning equipment that would ultimately cause a shutdown of the computer room equipment.

"Independent computer air conditioning equipment," he added, "should be located at a better security control point than standard building units."

Geographic locations can also affect the choice of air conditioning equipment. Using New England as an example, Kennedy said, "Here, we try to use either air-cooled or glycol-cooled equipment."

Both will operate during high and very low temperature periods. Operation in areas of temperature extremes usually requires equipment of the dual-circuit type, sized with 20% to 25% overage to compensate for mechanical failures.

Unfortunately, Kennedy said, air conditioning can sometimes cause smoke, dirt or dust to enter the computer room. For instance, fresh air intakes often ferry sand and other particles from the outside into the building.

"Operations can be stopped if regular inspection of filters and cuts are not made. Provisions should also be made to install packaged units with an alarm system that would trigger when the air conditioning or humidity falls below or above the computer room's operating range."

Kennedy further recommends the use of a temperature and humidity recorder, "to be located within the computer room and wired to sound an alarm when temperatures or humidity veer from normal operating ranges."

Prime Power Sources

Computer manufacturers and users lately have become very sensitive, worrying about the growing specter of power shortages. Power drags are being felt throughout the nation, and it appears the situation will continue to worsen before it improves.

One electrical engineer affirmed that a computer system with an external voltage regulator has less chance of data loss because of power outages than one without an external regulator.

But, he claimed, the only sure method of guaranteeing a computer system against loss of data or circuitry damage is with an uninterruptable power supply system.

Electrical power, said John Bassett, a product engineer for Sola Electric Division, is becoming more and more unpredictable.

"Power companies are causing troubles for their customers with sensitive power needs by

(Continued on Page S/8)

Facilities Protection Check List

The most insecure position for an EDP center to be in, is to THINK one is secure. The check list below highlights possible weak points in your data processing operation and facilities.

- ☐ Is there a time during the week when no one is on site?
- ☐ Does the computer site have a ground floor location and possibly a "show case" window?
- ☐ Are non-operating types allowed in the computer room?
- ☐ Is is possible to enter the computer room without making a formal request?
- ☐ Is there a time when only one person is on site?
- ☐ Is the computer site below ground level?
- ☐ Is the air conditioning outside air intake at ground level?
- ☐ Is direct access into computer facility possible from the outside or through a public hallway?
- ☐ What is the percentage of power draw to available power?
- ☐ Where is the closest back-up site?
- ☐ Is the configuration of the back-up site compatible with all your programs?
- ☐ Do your computer operators know what the marginal operating conditions are?
- ☐ Do computer room personnel know emergency procedures?
- ☐ Are fire extinguishers handy, and are there fire and smoke detectors present?
- ☐ Are there any combustible materials in the construction of the facilities?
- ☐ Is there a telephone in the computer room?
- ☐ Is the facility secure against sabotage and vandalism?
- ☐ Is the file storage area separated from the computer room? Does it provide a proper environment and give good protection against fire?
- ☐ What are the exposures to flooding? Would a burst pipe or rising river cause damage?
- ☐ Can access be controlled?

Is the Computer Horning In On Privacy?

By Don Strong
Supplements Editor

Man has a natural aversion to becoming a statistic, a mere figure to be mulled over, like the highway death count on a Labor Day weekend.

Yet, for all its tremendous benefits, computerization may be doing just that: threatening the one sanctity man has left – his right to privacy.

The fantastic efficiency of the computer, which in itself, according to one EDP observer, is no more active than an old-fashioned filing cabinet, has made it possible to reduce much information about an individual onto a tiny portion of a single reel of magnetic tape.

Storing information about ourselves – the pluses and minuses of our lives – is not wholly distasteful. The realization that in a matter of a few nanoseconds an entire lifetime can be translated for anyone clever enough to gain access to a computerized information system IS.

Described as "the right to be let alone", privacy, in the opinion of three observers of the data processing environment, borders on extinction. Their concerns are in step with a rapidly-marching campaign to recapture democracy and privacy from the computer.

Danger Signals

Congressman Cornelius E. Gallagher (D-N.J.), a strong critic of the computer's "invasion of privacy," states there must be an awareness of two danger signals before a cure can be effected: First, how important is privacy to the American experience, and second, why is it regarded particularly vulnerable to computer technology?

"Although privacy is not mentioned by name in the Constitution," he says, "the Bill of Rights contains guarantees against all methods to invade privacy which were prevalent in the 18th Century. A man cannot be compelled to give up his home to quarter troops; a man cannot be forced to give testimony against himself. Perhaps most important are the words of the Fourth Amendment:

'The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, ...'"

Gallagher argues these provisions constitute the boundaries of what he calls "the intellectual imperative," an area of psychological and physical living space in which man has control over the spread of information about his actions and his beliefs.

"The intellectual imperative," he says, "is an attempt to translate the guarantees of the Constitution into a viable and coherent theory, in order to provide a counterweight to the incredible sophistication of information technology."

Vital questions arise out of this discussion, Gallagher points out. For example; how does society make *due process of law* relevant when reels of tape containing the intimate personal details of millions of lives can be transferred from a computer in one jurisdiction to a computer in another?

How can a man face his accuser when his records are submerged in an inaccessible data bank which he scarcely knows exists, much less has the technical expertise to form questions?

Gallagher further mentions that in arguments over computer privacy, the "deprivitization" of the individual citizen is not the one and only problem. "A second danger signal of the cancer which may destroy democracy is on the other side of the coin, the controllers of the machinery."

Who, he asks, will control the information if something like a national data bank is constructed? "How close are we to creating an anti-democratic elite which is responsive only to its own will in its manipulation of a dehumanized citizenry? What are the early warning signals now visible which point to a totalitarianism which may begin as benevolent, but whose future actions will be unpredictable because it cannot be controlled by a responsible public?"

Computer technology is at a crossroads, Gallagher concludes. "It can be used to elevate man – as it has delivered him to the moon – or it can be used to enslave him."

File Security

Data file security is another matter of grave concern to privacy supporters.

The Earl of Halsbury, president and chairman of council of the British Computer Society, comments in a recent article: "It would be disastrous if one person wrote something into another person's file."

Lord Halsbury states, in the case of a written document, if anybody alters it, an expert can tell that the document has been altered.

"The document may be merely expunged, as they did in the Middle Ages, or have a line drawn through it, as later, or the ink may be scratched out with a knife and something overwritten; but there is always a trace left. In the case of a magnetic mark on a tape no trace is left. A particular dot, or bit, can be written and overwritten many times without leaving a trace, making it impossible to find out whether something has been overwritten or not."

Lord Halsbury also considers it essential that some records not go on the computer.

"There are, of course, certain matters which it is very proper to keep secret. The whole system of references and referees depends on security between the referee and the potential employer to whom the reference is addressed. If a man applies for a job and gives references, and those references are taken up, they must remain confidential for the very simple reason that nobody will give references if, on those occasions when bad references are given, they are landed with a personal embarrassment through break of confidence. Therefore, references and certain other records should not go on the computer."

Such a principle, he feels, could almost be added to the list of human rights, along with "the right of print-out for the person to whom the computer records relate."

A Heavy Burden

The burden of answering the questions raised here is growing for the average individual, opines a man whose very business is record-keeping in the space-age.

Robert P. Henderson, vice-president and general manager of Honeywell's Electronic Data Processing Division, says we are all leaving behind a longer and longer trail; information is gained by birth records, employment records, Social Security, Selective Service, police, hospitals, credit bureaus, Internal Revenue Service, and Census.

"In the cashless society to come," he predicts, "even the smallest transactions may be fed instantly into central computers to put every detail of our daily life on record."

Knock off work in mid-afternoon to see a movie or play a round of golf, he warns, and that tiny transgression may be irrefutably noted when the credit account card is processed at the box office or club house.

"If we cannot stop this relentless flow of information about ourselves into central files," Henderson states, "we can at least build a filtering system to control it. For example, trivial informaton – such as that visit to the movie or golf course – could be recorded on independent data systems which are periodically erased."

Henderson suggests a time limit on all personal data, so that "a youthful indiscretion wouldn't haunt a man's records for the rest of his life."

He also sees a need for new legislation to defend privacy against data-collection and record-keeping.

Henderson is convinced the entire data processing industry, along with an informed general public, must exert stronger influence on the ethical standards governing the use of computers.

Failure to do so, he says, will lead us to "a rigid, automated bureaucracy with great knowledge and power but little regard for the human consequences of its program."

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Computer Frauds Prove There's...

Much Monkey Business in EDP Operations

By Don Strong
CW Supplement Editor

Fraudulent is too classy a word for the computer employee who tampers with accounting systems and embezzles large sums of money. He is simply a thief.

Yet, while his threat is a real one, it is perhaps one of the most overlooked no-no's in data processing security today.

The losses created by his criminal manipulations are often neglected by EDP management. A basic reason is that many executives have been, according to Roy N. Freed, "lulled into a false sense of security."

Freed, a Boston attorney who has devoted much study to the computer fraud menace, said "many top-line managers undoubtedly attribute to computer accounting systems a greater internal resistance to tampering than is warranted by the facts."

Others, he stated, are probably deterred from requiring protective measures by the complexity of the technology.

Because management is so often hesistant to take the proper course of corrective action, criminal activities such as the following take place right under their very noses:

- An outside computer programmer for a Minneapolis bank was charged with installing a "patch" to prevent the computer from reporting his own bad checks. A total overdraft of $1,357.33 was discovered when the computer system broke down and the bank resumed account processing by hand.
- One company vice-president embezzled about $250,000 over eight years by personally creating falsely punched cards.
- The computer of the Chicago Board of Education was used by a number of its employees to do the work of their own data processing firm.

Legal Implications

Monetary loss may not be the only serious consequence of computer fraud. Freed pointed out the legal implications regarding top management people who fail to incorporate proper controls.

"They run," he says, "the two major legal risks of incurring personal liability to their corporation for its losses and to its stockholders whose investments suffer as the result of the criminal actions."

Each corporate officer, he adds, also has a legal duty to his company to exercise the care in the performance of his duties that a reasonably prudent man would devote to his own affairs. "What is more, he is obligated to reimburse his corporation for all losses resulting from his failure to exercise such care."

Good Defenses

Regardless of whose responsibility it is to catch a thief, he must be caught. Several defenses have proven successful in guarding against fraud.

- Surprise audits by an outside firm.
- Up-to-date totals on computer inputs and outputs that include enough information for efficient tracing.
- A log of recording computer time and the users.
- Programming the computer to check for unauthorized vendors.
- Provisions for automatically preparing and delivering written reports directly to responsible personnel in case of interruptions of machine operation.

A recent FBI study of embezzlers reveals that there are more inside thefts during times of prosperity. Seventy-five per cent of all embezzlers, the report states, steal not for necessity, but for luxuries of life. In times of prosperity the longing for luxuries is greater and the fear for losing one's job is smaller.

All this, it seems, leads us to believe there will be little "monkeying around" these days.

Don't be too sure. It may be precisely the climate a potential fraud is seeking.

Don't commit another no-no.

Back-Up is Not All Or Nothing Choice

The product of back-up planning is a comprehensive contingency plan which includes a full range of options to accomodate the full range of possible accidents from the temporary failure of a hardware unit to the total loss of the EDP Center.

This statement from a Boston security consulting firm points out the need for EDP management to consider additional defenses against delayed processing.

The contingency plan, according to the firm, Bradford Associates, Inc., includes three basic elements:

- The criteria for selecting a particular back-up mode depending on the nature of the accident.
- Detailed instructions for initiating each back-up mode.
- Detailed instructions for operating in each back-up mode.

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Security Protection For Computer Files Necessary

By Robert V. Jacobson
Special to Computerworld

Probably the most striking feature of any computer system is the fact that files cannot be read by humans and can be altered very swiftly without leaving a trace. There is no practical way to find out by inspection what used to be recorded on a magnetic tape or even if it has been changed.

There are really only three ways in which a process can go wrong – errors in the input data, errors in the programs or changes in the files.

If input data is incorrectly encoded, not entered, or spurious data is added, the resulting processing is obviously going to be wrong. Likewise a program which has design defects (bugs) or has been incorrectly altered can produce improper results even though the input data is perfectly correct.

If a file is in error, processes using it cannot be expected to yield correct results. A file can be damaged by defective hardware, by erroneous input data or by a defective program. There is also the possibility that an individual having access to the file and a computer and adequate technical skills could alter it outside the normal flow of processing for his own purposes.

What to Do?

There are two basic kinds of files, those mainstream to the processing, and those used for control audit, and protective purposes. Each type can be victimized by the hazards mentioned above. It is necessary to examine what steps to take to insure proper file security.

This can be achieved best through a logically designed program of controls and procedures. The current version of a file, first of all, should never be released for processing until reconstruction is possible should it become defective for any reason.

This implies storage at a separate location of earlier versions of the file together with the transactions needed to reconstruct the current version. These back-up files need a proper environment, controlled temperature and humidity, protection against catastrophies, and access to them must be under the control of a group independent of the computer operations staff.

Such requirements are most easily met by maintaining a separated storage area of vault-like characteristics with access limited to control group personnel who in turn are denied access to the computer room. It may also be wise to store additional copies of key files at some distance from the computer facility building to guard against a major catastrophe.

Careful Controls Vital

Since input data can affect files, careful controls over it are important. Groups which originate input data should maintain records of control totals and check them against the totals produced independently by the editing processes.

The input data itself, punched cards or magnetic tape, should be supervised by a control group to protect it against tampering and to assure that it is indeed processed, but not twice or not at all.

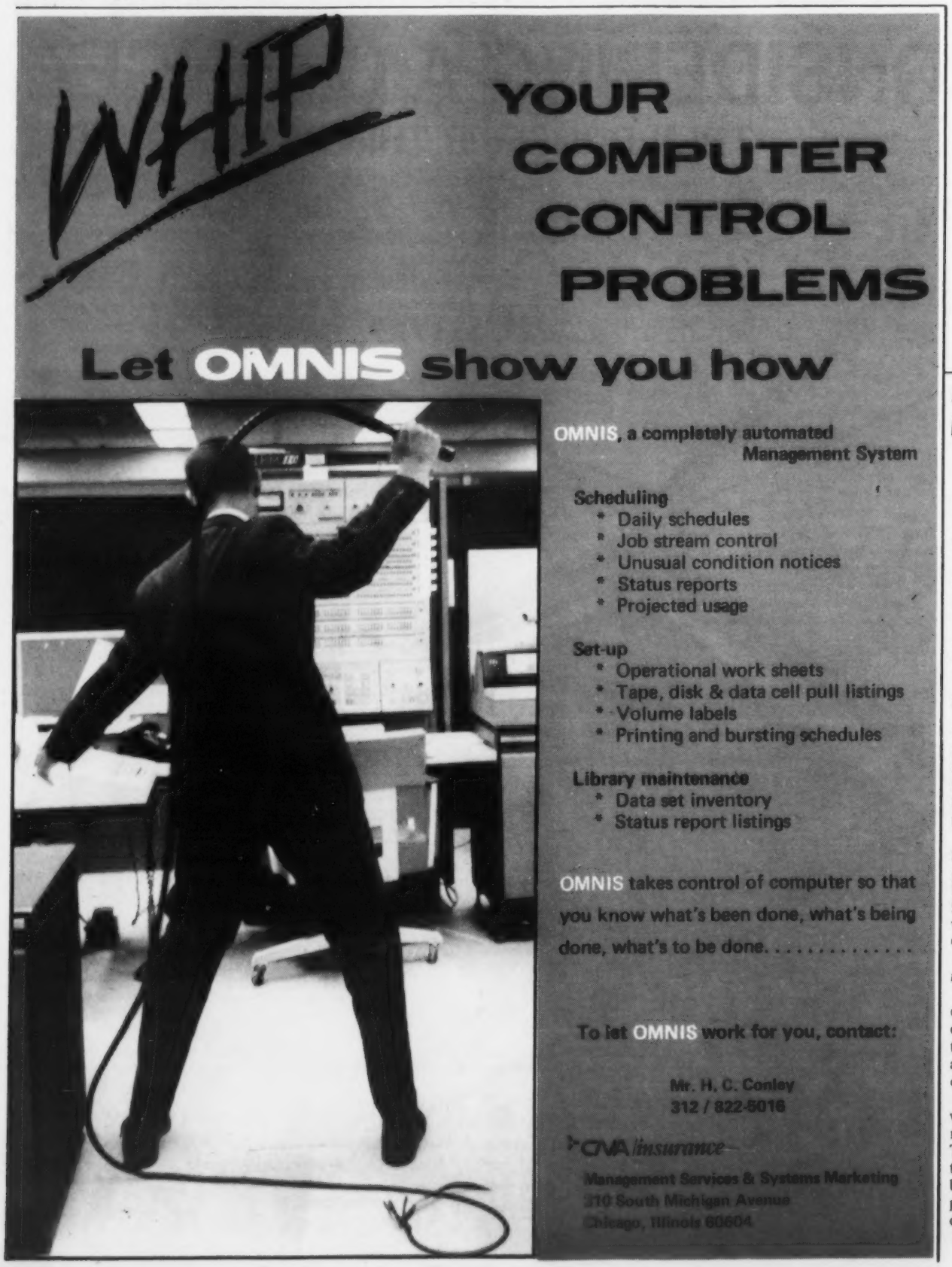
The need for rigorous systematic testing before a program becomes operational cannot be over-stressed. Too often tests are designed and performed by the very people who wrote the program and often concentrate on demonstrating that the program does what it is supposed to do when everything is in order.

Testing should be handled by others and should include tests to assure erroneous data and procedures will be properly handled. Back-up copies of programs should also be retained to guard against loss of the master.

Clearly, there is no simple "cookbook" approach to file security. Each facility must be systematically reviewed to identify the key files, the points at which controls should be imposed, the best operating procedures, and the weak links in the physical facility that need strengthening. There must be appropriate security measures, trained personnel and the necessary facilities and procedural changes.

Lastly, the program should be subject to continuing audit, independent of the data processing staff, to assure compliance with established procedures and controls. The auditors should in turn be alert to changing circumstances affecting security, including building alternations and changes or additions to computer processes.

Robert V. Jacobson is president of Bradford Associates, Inc., Wellesley, Mass., a consulting firm specializing in data processing security.



Auditors Play Key Role In Data Security

By Joseph J. Wasserman
Special to Computerworld

Newspaper headlines recently have blared forth stories of embezzlement by means of computer – and in the process have raised a dark cloud that looks a lot more menacing than it really is. There are some cases on record of fraud through electronic data processing systems, but they are few and far between.

Actually, programming errors and "bugs" in computer systems are costing business more than all deliberate attempts to steal through the machine put together.

How can modern business realize the full potential of the computer and still protect itself against ordinary human error, which, with no criminal intent, may scramble records and cost thousands of dollars before it is found and corrected?

Nobody can guarantee systems that are foolproof and wholly adequate in the prevention of detection of fraud. But the best line of defense against either error or fraud in a combination of properly supervised operations, and systems that incorporate good management controls – and *the proper kind of computer auditing.*

With the computer literally turning traditional ways of managing business upside down, it is easy to forget how recently the electonic calculating machine was applied principally to routine accounting chores.

As it has become faster and more versatile, the computer has been given more and more non-accounting functions. Today, computers are playing an important part in nearly all operations of the business. And today's use of the computer only sketches the shape of things to come.

By the same token, the role of the

(Continued on Page S/7)

Processing Vital Records

Service Bureaus Need to Improve Data Security

By Morton Davis
Special to Computerworld

Several relevant security considerations always crop up when doing business with a service bureau, and each is underscored by the bureau's problems in processing vital records.

Basic to overcoming these problems is the need for a good installation management with an effective security system built on sound operational principles such as orderliness, employee discipline and proper controls.

From the bureau's viewpoint, the proper time to design security into the processing of a customer's job(s) is when the customer first becomes associated with the bureau. If the question is deferred until some "convenient" later moment, either that time will never arrive or the security system will be a patch-up job.

Of prime importance is the determination of what records are vital. It seems obvious, but the bureau often doesn't know what part of a customer's records should be protected, and to what extent, because the customer simply never tells them.

Security & Efficiency

Another conflict arises between security and efficiency. Proper security most often means separate media (tapes, cards, disk packs) for storage of each customer's file. This is normal practice for master files stored on magnetic tape but efficiency considerations for a multiprogrammed computer often lead to the the desire to share a given physical disk pack among several customer's files or a given "spooled" print file tape among reports for several customers. Better protective measures would be separate media for each customer, with a consequent decrease in operating efficiency.

One area of security almost never considered is that the bureau should request customers to provide some means of ascertaining which of the customer's personnel are authorized to see or modify the files and programs, as well as who is designated to receive (or pick up) reports.

A particular problem is posed for the service bureau handling jobs for competing customers. Here, all normal security measures should apply, but bureaus which specialize in job handling by industry should be particularly mindful of accidental revelation of trade secrets as when a member of the bureau says "Why do you do it that way? XYZ company does it by this method."

Is your bureau slowing up when it comes to data security?

Also there is a chance for damaging mix-up with bureaus that offer particular "packaged" applications, formats, and file descriptions nearly identical for each customer.

Employees' Security

The relationship of the bureau's employees to its customers is another important factor. While it is nearly impossible to check out all facets of possible relationships such as wives, relatives and friends, the bureau should try to determine, in advance, whether any employees who will be working on a customer's jobs have an obvious motive to break security in regard to that customer.

Finally, the question of service bureau liability in case of a break of security or loss of vital information is not always well defined. For this reason, the bureau does not know how much emphasis to place on protection and security.

One complication is that the media on which files are stored generally belong to the bureau, while it is not clear whether information, which has a very tentative physical existence, belongs to the customer or to the bureau, especially if it is the result of a processing run.

In settling these questions in advance, "Gentleman's Agreements" won't do. The onus should be on the bureau to establish what it is supposed to do or not do.

Morton Davis is a program manager for Honeywell's Electronic Data Processing Division, Waltham, Mass. He is presently responsible for coordinating the implementation of future product strategies.

Auditors Play Key Role

(Continued from Page S/6)

internal auditor has broadened tremendously. Not long ago the auditor was pretty much restricted to verifying the accuracy of accounting department computations.

Now, at least in the more progressive firms, the functions of the auditor are as broad as the total operation of the business. The auditor's new job, which has been defined as operational or management auditing, is gradually gaining recognition.

"Gradually" is emphasized, because in too many cases computer and auditor are relative strangers. There are two reasons for this. First, companies are trying to do today's work with yesterday's auditors.

Second, too many auditors never really became involved with punched-card computer systems, thereby gaining at least a nodding acquaintance with the older systems. Now they face a huge gap between the ledgers of the past and the integrated electronic data processing systems of today and tomorrow.

Today's high-speed magnetic tape systems demand that the auditor now must work through the machine – meaning he must understand what the program is doing and how it does it.

Joseph J. Wasserman is President of Computer Audit Systems, Inc.

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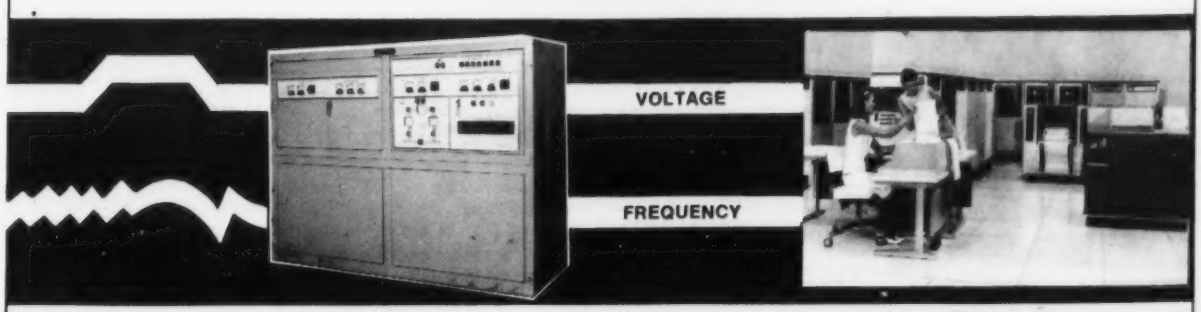

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Looking at Transients...

Can Microsecond Glich Scare Nanosecond Computer?

By John Bradley
Special to Computerworld

In this advanced industrial society, electrical power is an omnipresent source of energy. Not all of this energy, however, is confined to useful channels. For example, when elevators start an ascent cycle, for a brief moment the substantial increase in demand current through the shaft motor can cause an electromagnetic field to be broadcast, sometimes for considerable distances if a spark gap is involved. Other stop-and-go machines such as air conditioners, commercial kitchen machinery, and printing presses also generate such fields.

Not all such random electrical transients (sometimes informally called "gliches" or "spikes" by engineers) are due to man-made devices; nature creates similar momentary disturbances which are broadcast over even wider areas.

The annual frequency of these disturbances may be quite high in some areas in the U.S. and particularly in the tropics where thunderstorms are a year-round occurrence. In this polluted electrical environment, many data processing center managers are operating a sensitive electrical device (the computer) without being aware of its true vulnerability.

Modern Computer Vulnerable

The reasons behind this vulnerability are concerned with the extremely high switching speeds with which third generation computer systems were designed. Instructions for these computers are executed in as little as seven microseconds, with their identifying operation codes (contained in a single byte) requiring only nanoseconds.

Man-made and atmospheric disturbances, on the other hand, can produce transients which persist for many microseconds and range easily into the millisecond category.

It is obvious that, if these distrubances are able to gain access to the computer circuitry which controls the processing of the binary intelligence signals, a serious swamping action can occur. The question then arises: how can a microsecond glich gain access to this sensitive environment?

There are a number of paths by which transient intruders can enter a computer system. Communication lines servicing the system for time-sharing or any purpose are typically exposed to the elements of nature and offer one access path.

Direct lightning hits are easily recognized, and there are well-known protective devices for this level of disturbance. But there are frequent lightning discharges in some areas which do not result in sufficiently large surges to bring the conventional protective device into play. It is this category of natural disturbance that can enter the communication line in the guise of normal data signals for whatever havoc there is to play.

Power lines offer a similar invitation to atmospheric disturbances.

In addition, the source of power itself, the local utility, can send along with its regular paid-for product an additional component free of charge. A daily sequence of events occurring among the population of all large cities causes utility power houses to have to switch extra generators on-line with their regular configuration to meet the extra demand imposed by early morning lights, breakfast toasters, shavers, etc. The act of switching produces a particularly awesome transient which may ultimately find its way to the computer's own power supply, and thence to the data-manipulating circuits.

Impact of Parity Checks

A parity system was conceived early in the development of the digital computer to aid in the retention of data integrity. In Ebcdic, parity is implemented by a ninth bit which is added to the eight basic data bits. This bit is set in an On or Off state automatically by the hardware system depending upon whether the eight data bits entering the computer are comprised of an *even* number of On-bits or an *odd* number of On-bits. The system works fine as long as only one bit, or three bits, or five bits, etc. are accidentally changed in a particular character since the even-odd relationship is disturbed and can then be detected. But if two bits, or four bits, or six bits are accidentally changed at the same time, the even-odd relationship remains unaltered and the parity system is not capable of detecting the change. An opportunity is thereby presented for the undetected development of invalid data by transients.

To offset this weakness of the single character parity check, a second parity check is employed in some parts of the computer system, as in the magnetic tape drive. Here, a block parity check is made of bits which are in the On state along the length of the tape (cyclic redundancy check) as well as across the width of the tape (character parity check). The probability of a random voltage transient entering this doubly guarded parity environment is very small, though not impossible. (The probability of a purposefully designed counter-intelligence transient violating this area, doubly guarded though it may be, is quite another story.)

What is being done about the transient problem? A number of new companies have sprung up around the need to supply special power systems for computer centers, and laboratories of the federal government and the computer manufacturers are working on the detection of the hit-and-run bandit itself. A comforting step forward will have been achieved when the programmer can point with confidence to a strip-recorder printout of transients occurring during his run rather than to "unknown" causes for costly reruns.

John Bradley is an engineering consultant on data processing systems.

Disaster Protection for EDP Centers

(Continued from Page S/3)

switching current flow from area to area as needs require, raising the chance of a power reduction hitting a computer system," Bassett charged.

Bassett also blames computer equipment manufacturers for "not designing their machines, it seems, to be compatible with any type of power disturbance." He did state, however, that manufacturers were beginning to add sensing devices to their equipment, "to anticipate oncoming power failure.

"Computer people are adding the fail-safe type of circuitry, realizing that the power supply is not going to be as reliable as they had built their machine for," he noted.

Bassett also said there is no attempt to divide power in their machines.

What can be done electrically to make computers more reliable? Isolation is his answer. "Have two inputs; one for power that takes very fast responding time for any fail-safe circuitry they may need, and another one for the less sensitive components."

Shortage Preventive Methods

Computer room power has been turned off on many occasions during a run by unknowing building maintenance personnel. These shutdowns may be minor compared to giant power failures such as the Northeast blackout in 1965, yet there are several approaches for improving reliability of the prime power source.

Some of these, according to Robert Jacobson, can be costly, and each should be weighed carefully against the estimated cost of delays.

"For example," Jacobson said, "an automatic auxiliary power generator clearly is unnecessary for a one-shift batch processing operation, but might be entirely justifiable economically for a major real-time system."

Approaches cited are:

- Locating and tagging panel boxes to minimize accident cutoffs.
- Insuring that hardware and air conditioners do not share branch circuits with other loads.
- Enter power by independent distribution circuits from two substations to protect against local outages.

Other solutions are suggested by Lee Kennedy: "In some instances, it may be necessary to install a secondary voltage regulator in the main feeder line before it reaches the circuit breaker panel in the computer room. The regulator eliminates fluctuations from power drops caused by power companies cutting back on their supply."

Kennedy also finds that "locating additional emergency trip-shut switches at computer room egresses makes emergency shut-off more convenient."

Loss Prevention

The EDP center manager evaluating the importance of a loss prevention program has only to look at the page 3 Pentagon fire photo to reach a decision.

Each year, equipment and property damage losses caused by fire, heat, water and smoke reach staggering proportions, not to mention injury to personnel and destruction of vital data.

Sprinkler systems, fire alarms, and smoke and heat detectors are only partial safeguards. To minimize loss to EDP hardware, software and records, the center manager must:

- Protect hardware with waterproof covers.
- Return tapes and disks to fire proof vaults, designed specifically for their protection.
- Make prompt disposal of trash and line printer output.
- Regularly inspect underfloor spaces.
- Maintain a ban on smoking in the computer room.
- Instruct personnel in fire fighting procedures.
- Maintain an emergency evacuation plan.

Riot, Sabotage & Vandalism

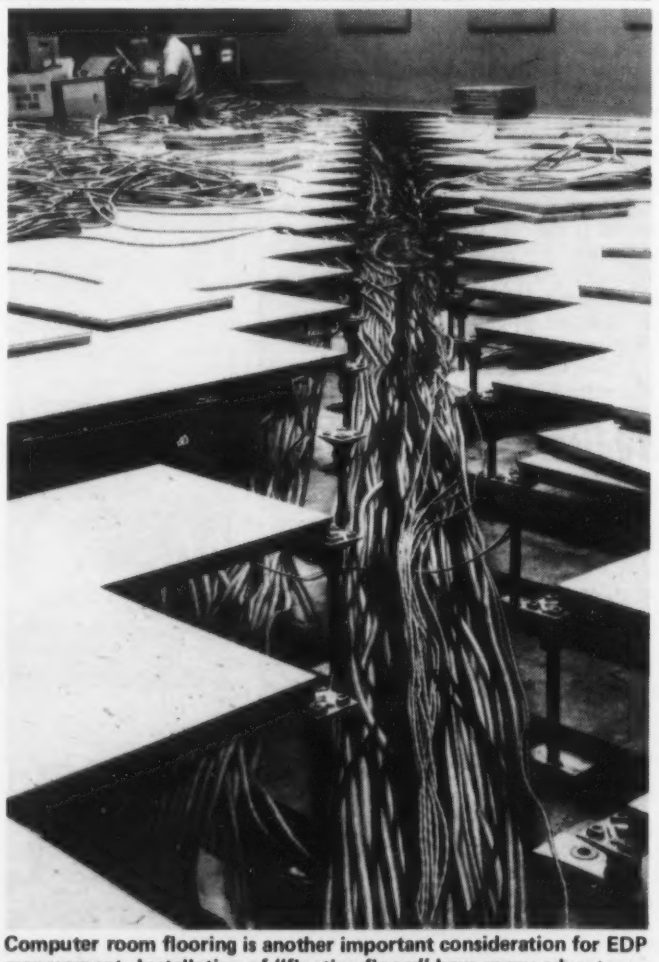
The menace of angry rioters and vandals, and the possibility of sabotage by disgruntled employees and other malcontents should not be overlooked.

For instance, a saboteur, be his motive vengeance or profit, can use a permanent magnet, purchased at the local hardware store or one removed from a child's toy, to continuously and completely destroy vital data on tape or disk.

To combat this situation, an Illinois firm specializing in sophisticated electronic protection systems has developed a system to detect any magnet exceeding the threshhold required to destroy or damage data on a tape.

The system, according to a company spokesman, not only detects the magnet, but alerts management of the potential disaster and simultaneously refuses admission to anyone possessing a magnetized object.

Vandalism, riot and theft also constitute a growing threat to mailing and inventory lists, production control, accounts receivable, stockholder lists, depositors and loan accounts.



Computer room flooring is another important consideration for EDP management. Installation of "floating floors" have many advantages, including easier computer cable hook-up (above).

Among other factors affecting the computer's well-being are contaminants and shock and vibration.

Although the damage caused by corrosive chemicals in the atmosphere is universally acknowledged, there are still a number of DP installations with inadequate protection.

While most DP installations servicing commercial applications are usually located in a physically stable environment, others, involving control systems, data acquisition and on-site processing, are frequently situated near shock and vibration producing devices. These often have a pronounced effect on moving-head rotating memories.

System/Unit / Features	Periphonics Voicepac 2000	IBM 7770 Audio Response Unit	Burroughs Audio Response System	Honeywell Audio Response System	RCA 70/510 Voice Response System
Vocabulary Size (words)	40	32	189	189	189
Word Length (seconds)	Unlimited	0.5	0.5	0.5	0.5
Data Lines	20	4	10	6	10
Storage Medium	high speed disc	magnetic sleeve	film cylinders	film strip	drum
On-Site Vocabulary Revision	yes	no	no	no	no
Rental/Mo	$1,720*	$1,165	$795	$1,692	$746

*40 – word system

Comparison of typical audio response systems with Periphonics Voicepac 2000.

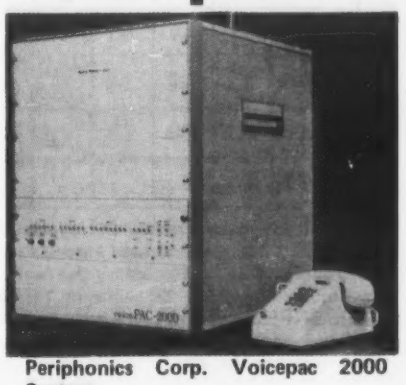
Periphonics Audio System Uses Disk, Minicomputer

By Ronald A. Frank
CW Technical Editor

ROCKY POINT, N.Y. – An audio response system that uses a random access disk unit for vocabulary storage has been developed by Periphonics Corp.

The Voicepac 2000 system is compatible with IBM 360 CPUs by means of a minicomputer interface which acts as a front end processor for the system. When used with a 360, the Voicepac 2000 uses a Data General Nova (or other mini) that is programmed to make the main CPU think it is looking at a tape drive instead of an audio response system.

According to Periphonics, this type of interfacing reduces the processing of the 360 to about 25% of that required for a normal tape drive operating on-line.



Periphonics Corp. Voicepac 2000 System

Access

The disk unit allows users to access any work in the system's vocabulary in 33 msec or less, a company spokesman said.

In addition, the Voicepac 2000 system provides the user with the capability to modify the response vocabulary by using a microphone with an encoder module control box. The vocabulary storage is controlled by software in the Nova, which the firm says can also be easily changed by the user.

The Voicepac 2000 system uses a Touch-Tone telephone or acoustically coupled terminal as the computer I/O device. When interfaced to a CPU, or as a stand-alone system with the minicomputer, the system conveys the alphanumeric input tone of the telephone to the computer which then responds in a human voice.

User Selects Vocabulary

The computer's pre-recorded vocabulary (up to 2,000 words) is selected by the user and stored in an audio memory unit from which the output messages are assembled.

The system can be configured to provide adequate safeguards against unauthorized access by the use coded inquiry statements that can be modified as necessary by the user, the company said.

Although at present the system has been interfaced only with the 360, a spokesman said interfaces are being developed for the RCA Spectra series and others. In addition to using the Nova as a front end, a DEC PDP-8 has been used, and most other minis will probably be compatible with the system, the company said.

When used to communicate with remote sites, the Voicepac 2000 system acts as a buffered data terminal, handling up to 120 data lines in a serial access mode. The system is compatible with dial-up data lines, and full- or half-duplex operation can be handled at up to 9,600 bit/sec, the company said.

Prices for a basic 40-word system, with minicomputer, begin at $27,000 with a 36 month lease plan costing the user $1,350/mo, including maintenance.

First deliveries are scheduled for December and orders will be filled in 60 days, according to a spokesman.

Periphonics Corp. is at Route 25A, Rocky Point, N.Y.

User Can Print Tapes, Handle Card Input with Mohawk Station

HERKIMER, N.Y. – A computer user can print his magnetic tapes at high speed while performing such operations as editing and compiling summary records without tying up his computer. This is made possible by a series of off-line print stations from Mohawk Data Sciences Corp. (MDS).

Especially attractive to the installation that has several different processing systems, the 2501 series incorporates a programmable special-purpose computer as a controller. This allows the station to simulate virtually any standard computer, the company said.

Variety of Systems

Programs are available from Mohawk to allow the users of a wide variety of computing systems to make use of the stations.

In addition to the emulation of a computer system, the 2501s can produce reports in any format desired by the customer. Card readers and read/write tape drives can be attached for the performance of more complex operations.

8K Possible

The series consists of two models, the 2501 Level 1 and the 2501 Level 2. Common to both is the controller with 4K of memory with an additional 4K available as an option. The printer on both is capable of printing 1,250 line/min with a 64-character set. Three different card readers can be used with the series, a 400 card/min punched card reader, a 400 card/min version with mark-sensing capability, and a 1,000 card/min reader.

The 2501 Level 1 is equipped with read-only tape drives while the Level 2 has read/write tape drives,. MDS said the units are available in both 7- and 9-track versions.

Other features of the 2501 series include:

- 1,024, 2,048, or 4,096 character input buffers.
- Print line length variable up to 160 positions.
- Customer selected End-of-Line and End-of-File codes, in any amount or assigned positions.
- Vertical form control, compatible with all major computer systems.
- Optional file selection, to selectively print only designated records of a file.
- Software-adjustable code to character translation, with 64- or 128-character graphic sets.

Price

The lease price of the Level 1 is $1,450/mo, including maintenance, on a one-year lease. The purchase price is $57,000, with maintenance costing $275/mo.

The one-year lease on the Level 2 has been set at $1,600, including maintenance. and sells for $64,000. Maintenance adds $325/mo to the purchase cost.

The 7-track tape drive is priced at $10,000, or rents for $210/mo, and carries a monthly maintenance charge of $40. Of the two 9-track tape units, the 800 bit/in carries the same prices as the 7-track device, while the 1,600 bit/in. drive sells for $22,500 or can be rented for $425/mo plus $75/mo for maintenance.

Prices of the card readers have yet to be set.

The MDS 2501 Level 1 is currently available. The Level 2 is scheduled for first customer deliveries in April, 1971.

Datum Drum Systems Interface, Increase Storage of H-P Minis

ANAHEIM, Calif. – A mass storage system designed for interfacing with Hewlett-Packard (HP) 2114, 2115 and 2116 minicomputers is available from Datum, Inc.

Designated the Model 60X8 -H-P Drum System, the device allows users of the HP 2114 and 2115 minicomputers to expand storage capacity beyond the 8K limit inherent in these machines. Four storage capacities of 16-bit words are offered: 32,000, 64,000, 130,000 or 262,000.

All systems are software-compatible with the HP Drum Operating System, the company states. The Model 60X8 system consists of a high-performance drum, a controller, interconnecting cables and computer interface cards.

The controller circuitry is contained on the two interface cards, which are plugged into existing card slots within the computer. A single controller may control up to four drum memory units, made by California Peripherals Division of Datum.

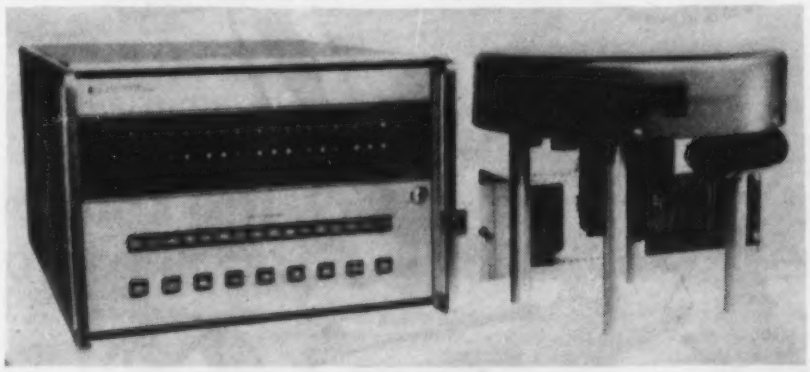
Data transfers are normally made by direct memory access (DMA). For computers without DMA transfer capability, an optional system may be used for programmed I/O transfers.

Additional features of the system include: write protection on a selected track basis and error checking on a word basis. Transfer rates of from 88,000 to 130,000 word/sec are possible, depending on the drum type selected, the company stated.

The company later will be offering similar drum systems for Honeywell minicomputers, a spokesman said.

Complete system prices start at under $6,000, with 32K storage capacity. Delivery is 60 to 75 days.

Datum, Inc. is at 170 E. Liberty Ave.



Datum, Inc. Model 60X8-H-P Drum System

CRT Terminal Has 2K Character Display

ANAHEIM, Calif. – An interactive CRT display terminal from Lear Siegler, Inc., Electronic Instrumentation Division, incorporates a typewriter keyboard, control logic, character generator, refresh memory and interface.

Designated the Model 7700, the terminal has a 12-in. diagonal CRT which displays 1,000 or 2,000 characters.

The terminal, compatible with EIA Standard RS232B, can be interfaced for asynchronous operation with the 103, 201, or 202 data sets. Synchronous operation is available as an option.

Refresh rate is 60 time/sec. Standard character set is 65 characters with 96 characters upper/lower case optional. Usascii code is used.

The Model 7700 Interactive Display Terminal is priced at $3,500, for 2,000 characters. First deliveries will begin in late fall on a 60-day schedule.

Lear Siegler, Inc., Electronic Instrumentation Division, is at 714 North Brookhurst St.

COLUMNS DUPLICATED	COLUMNS PUNCHED								
		10	20	30	40	50	60	70	80
	0	.43	.58	.66	.70	.73	.76	.77	.78
	10	.40	.56	.63	.68	.71	.74	.76	
	20	.38	.53	.61	.67	.70	.72		
	30	.36	.51	.60	.65	.69			
	40	.34	.49	.58	.65				
	50	.33	.48	.56					
	60	.31	.46						
	70	.30							

This comparison illustrates the approximate number of hours to record data on a key to tape machine compared to one hour on a keypunch. Time is affected by the number of columns duplicated and punched in an 80 column record. The chart assumes 7 operator detected and corrected errors per thousand keystrokes, and one second of additional time on a keypunch for card release, feed, and register. (Courtesy, Sangamo Electric Co.)

Keypunch Replacements Will Increase Costs; May Increase Productivity

(Continued from Page 1)

First, consider supplies costs. The average keypunch operator uses about $30 per month worth of non-reusable cards. Cards are bulky to store, both as supplies and after punching (everybody seems to keep source cards for at least a month).

Figure out how many cards you would save, and what the saved storage space is worth. Don't be surprised if it is more than $30 per operator, but we'll be content to slice that $90 per month differential by $30.

More Output?

Next, can our operators produce more output? The keypunch inhibits punching during card feeding and releasing, duplicating, and skipping. Keypunch replacements perform the latter two functions in microseconds, and tape write and checking cycles require less time than card feeding.

Some users claim increased productivity of 30% to 40% – others are disappointed in their less than expected production increase. Why?

Sangamo Electric Co. did some research. It found that short records, with a relatively large amount of duplicating, reduced recording time the most – long records, with little duplicating, the least. Sangamo also found that error correction on errors found by the operator (not in verification) was very time consuming, due to the need to release the card, duplicate to the error, and re-key. Error correction on keypunch replacements is simply a matter of backspacing and re-keying.

The percentage of detected "keystroke" errors is usually unknown. A good estimate can be made by walking through the keypunch department and looking at the operators wastebaskets!

Another point to remember is that when a keypunch operator is in doubt about an entry, it requires several keystrokes to check (even on a printing punch), and requires two strokes on any of the replacements. How much time is lost in checking errors that are not errors? How many errors are corrected at verification that might have been corrected originally, if it were only easier to do!

Users do report greater accuracy. Some are able to eliminate key verification on certain applications.

Sangamo prepared the chart shown here to reflect an estimate of the time saved over keypunching based upon record length, amount of record duplicated and skipped, and a factor for time saved in operator detected correction (estimated at seven corrections per thousand keystrokes). The chart shows a broad range of increased productivity. It will vary from application to application.

What is the "breakeven" point for increased productivity to justify changing equipment? Assume an average operator expense (including overhead) of $500/mo. Compare the costs per month per type of data recording station.

Item	Keypunch	Keypunch Replacement
Operator expense	$500	$500
Machine rental	75	165
Punched cards	30	0
Total	$605	$665

In round numbers, it costs 10% more per station to use keypunch replacements. If you can gain more than 10% in increased productivity (and many claim three or four as much), you can gain the other advantages of simplified error correction, greater accuracy, and increased input speed to the computer, for perhaps, less money than you are spending now.

Substitute your own actual costs or cost estimates in the above analysis – see what your "breakeven" point is!

H. Edward White has been an independent data processing consultant for the past seven years. He has had extensive experience with data recording and communications equipment, and is currently Manager for Corporate Planning at I/O Com Inc.

Buddy, can you spare a byte?

That's a dirty tape for you. It'll put the bite on your computer every time. Dirty tape causes data drop-outs. And drop-outs cost you money. Bum deal.

RCA Computer Tape helps computers lead more productive lives.

It's a special formulation that starts cleaner. Every inch of every reel is tested and certified in the cleanest of white room conditions. (We believe statistical testing is begging the question.) And it stays cleaner, longer.

So? Fewer drop-outs, more efficient computing.

Show your computer what the good, clean life is all about. Write RCA Magnetic Products, 201 East 50th Street, New York, New York 10022.

The first step is clean tape. Ours.

RCA Computer Tape

Honeywell Expands Record Sizes on Keytape Devices

SAN DIEGO, Calif. – Honeywell has expanded record sizes up to 400 characters on its Keytape data preparation equipment.

The new capability is available in eight to 200 characters or in eight to 400 characters, both expandable in increments of one. Delivered Keytape machines can be retrofitted with this capability at a price of $35, in three weeks.

The previous record length was 80 or 120 characters. Both 7- and 9-channel Keytape models incorporate the new feature, said the company.

The eight to 200-character model is priced at $1,500 or $30/mo in addition to the regular Keytape price. The eight to 400-character model is priced at $2,000 or $40/mo in addition to the regular Keytape price.

Honeywell, Data Products Division, is at 7820 Convoy Court.

Remember that beautiful girl who thought key-punch was something you drank on Ben Franklin's birthday?

Call her back and hire her. She can be an operator on your new data entry system. Not just for decoration: We've invented a data entry system that's operator-proof. (So it's obviously not key-punch.) It's our ENTREX™ 480 system: with its own computer and disk, controlling up to 64 individual DATA/SCOPE™ CRT keystations. If the beautiful girl can manipulate a typewriter, she can enter data. And she can verify data on the DATA/SCOPE™. For her, it's about as difficult as watching tv. She can learn in two hours. And our system doesn't depend on her accuracy alone. The computer validates the input information, allows verification, searches for any record and displays 480 characters at a time. If she still gets into a jam, our exclusive "Help!" button gets her out of it. We made it fast to save time. We made it operator-proof to save money. Of course, these are things you'll figure out when you see it yourself. So write or phone ENTREX, Inc., 113 Hartwell Ave., Lexington, MA 02173. (617) 862-7230.

ENTREX

How a little extra thought revolutionized the terminal.

Our revolutionary slogan

We thought about all the people who could be using remote batch terminals. How they deal in records and files.

And we thought how nice it would be if they could have a character-oriented terminal instead of a number cruncher.

We thought they would appreciate a terminal with a little intelligence. One that can be programmed to handle their kind of work. That's smart enough to take care of error detection, full overlap and automatic code conversion.

And we thought about how nice it would be if it could also operate offline as a stand-alone computer. To handle the little jobs in house. To do formatting and editing locally. Instead of over the telephone.

So we built the Hetra T/2 remote programmable terminal and made it plug compatible with most other terminals. Like the 2780. That makes it easy to install.

Finally, we thought about how little it cost us to make it. And we decided to pass the saving on by charging a much lower price. About 25% lower than the competition.

Wasn't that thoughtful?

The revolutionary Hetra T/2 terminal.

We thought about performance.
And built a smart terminal. With one-microsecond core. As much as 65K if you need it. And a processor that's completely programmable.

We thought about transmission.
A terminal should be quick. Our's handles 4,800 BPS on voice grade lines.

We thought about speed.
Our card reader is rated at 400 CPM. And we added a printer that runs at 600 LPM.

We thought about price.
And got it down to $33,950 with 8K of core and peripherals.

We thought about delivery.
And decided we could get you one in 90 days.

We thought you'd be interested.
Interested enough to dial (305) 723-7731 and get more information on your application.

We think harder.

HETRA P.O. Box 970, Melbourne, Florida 32901 (305) 723-7731

FCC Stays Telpak Sharing Requirement for 90 Days

By Don Leavitt
CW Staff Writer

WASHINGTON, D.C. – The Federal Communications Commission has rescinded, at least temporarily, its recent ruling requiring common carriers to make the shared rates under Telpak available to all users.

In the original ruling [CW, July 15], the FCC found that the current practice of allowing certain Telpak subscribers to sublease their channels to other users, while denying the same right to other Telpak subscribers, was discriminatory, and could not be tolerated. Instead, the commission said, the carriers must "extend the benefits of the Telpak shared rates to all private line customers without regard to the nature of their business."

The Telpak tariffs cover private line bulk communications services which are offered by AT&T and Western Union to large, high volume data users.

Reacting to several requests for reconsideration, the FCC has issued a stay of that order. The stay will remain in effect, the ruling said, until the commission has had the opportunity to decide what to do about the requests for reconsideration. In no case, a spokesman said, will the stay remain in force more than 90 days beyond the August 17 deadline previously set for the filing of new tariffs by the carriers to comply with the sharing order.

The requests for reconsideration and the temporary stay were filed in late July by the Bell System, Western Union and various Telpak users groups including airlines, railroads, truckers and bus fleet operators. Several of the petitioners threatened court action if the stay were not issued. At the same time, the Aerospace Industries Association opposed reconsideration and the stay, primarily because of the lengthy duration of the Telpak arguments.

A meeting held by the FCC after the reconsideration petitions were filed reflected the confusion caused by the sharing order. Most of those present seemed to see the order as bringing an end to Telpak, but an FCC spokesman told the group that elimination of Telpak would not be an acceptable substitute for compliance with the sharing order. Another FCC source added that unlimited sharing would be deemed the "minimum" form of complienace; he said a better solution would be a flat rate for all users.

AT&T used the meeting to deny plans for any other form of bulk service, largely because it sees no use in going through the "agonies of Telpak" again.

Robert. E. Bennis of Westinghouse Electric, and president of the International Communications Association, recognized the problems the carriers would have in administering Telpak under the sharing order. But he also took note of the physical problems and financial strains that would be imposed on a number of companies by the loss of Telpak.

Instead, he suggested that perhaps trade, professional or industry groups could take over the sharing administration, since most of the private-line users are members of such groups.

William. E. Miller, speaking for the airlines, said that the group he represented have "two sets of experts" working on bulk communications concepts. He added that they would be ready in any formal hearing.

It's okay, Susie. They're all in Fastbacks.

And that means those computer tapes are completely undamaged. Accidents do happen. Especially to Susie. Yet Susie's so nice to have around. So it's nice to know there's been no harm done. Thanks to FASTBACK – world's safest tape handling and storage system. (You can even drop them on edge.)

And FASTBACK is the world's fastest tape handling system, as well. Gives you more tape mounts per day. More than seals, canisters or cartridges. On any kind of drive, especially self-threading. Yet FASTBACK stores in the space of seals. Call your EDP man today. Ask him for a Susie poster.

ENGINEERED DATA PRODUCTS INC.
930 E. Drayton
Ferndale, Mich. 48220
(313) 399-4440

Multitran Can Intermix Data Rates, Equipment

LOS ANGELES – Users who want to be able to intermix a variety of high- and low-speed terminal equipment such as teletypewriters, CRTs, remote job entry terminals and/or COM units, can use the Multitran multiplexer system from Computer Transmission Corp. (CTC).

With Multitran, even small computers can be included with other devices and multiplexed to communicate with a central CPU, according to CTC.

The conventional pattern of two data sets and one line per terminal is eliminated by Multitran. Instead, all terminals in a remote location, regardless of type, can be intermixed and put on-line over a single communications link.

CTC claimed that a Multitran distribution system can use any communication medium – not only telephone lines, but also private twisted-pair facilities, microwave links, or CTC's infrared communication device, Optran. The company also noted that no multiplexer memory or processer is necessary, nor is special software required.

Normally operating in transparent full-duplex mode over dedicated channels, Multitran can function in half-duplex or simplex mode with required timing control signals, the company said.

CTC said that the system is programmable to provide intermixing of virtually any set of data rates with a total combined rate less than 2,000,000 bit/sec.

Interfaces on the loop-side are optional by card selection for high-speed current (AT&T 303 data set or equivalent), EIA RS 232-C, MIL-STD 188B, or for twisted pair cable interface.

The system provides the same digital interface options on the terminal side. Typewriter interface per EIA RS 232-C, is also available, the company said.

CTC also noted that a Multitran distribution system can be reconfigured to accomodate changes in equipment used, or in terminal speeds.

Multitran systems are presently being produced, the company said, and are available 60 days from date of order. Cost of the units vary depending on configuration requirements, but are in the $2,500 to $5,000 range, a company spokesman said.

Computer Transmission Corporation is at 1508 Cotner Avenue.

Accord Reached in Seminar

GENEVA – United States and Soviet attendees at a seminar on the use of computers as a management tool in industry have concurred on the need for further meetings, according to the International Labor Organization.

The Soviet delegation attending the five day seminar in Turin, Italy, was led by Dzhernan M. Gvishiani, first deputy chief of the Council of Ministers' Science and Technology Committee.

Among the Americans were Richard M. Cyert, dean of the Graduate School of Industrial Administration at Carnegie-Mellon University, Pittsburgh, and William F. Pounds, dean of Sloan School of Management, MIT.

APL Networks Provide Alternatives to Basic, Fortran

By Don Leavitt
CW Staff Writer

Nationwide time-sharing users primarily concerned with computations, matrix operations and/or text manipulation can move away from both Basic and Fortran and into enhanced versions of APL/360, with a choice of two networks, and two operational philosophies.

The newer of the two nets has developed from the affiliation of Proprietary Computer Systems, Inc. (formerly APL Computing Services) of Van Nuys, Calif., and The Computer Company of Richmond, Va.

Both companies operate large-scale 360s on which they have identical systems libraries of more than 1,500 programs, and their advanced APL service is called Action/APL.

Included in the affiliation are Computer Innovations, Chicago, and APL Services, Inc., of New York. Together the four companies said that they will provide APL service in Boston, Chicago, Los Angeles, Miami, New York, Norfolk, Philadelphia, Princeton, Richmond, San Diego, Santa Ana, Palo Alto, San Francisco, and Washington, D.C.

The other APL net is provided by Scientific Time Sharing Corp. (STSC), Washington, D.C., and is based on a CPU located in Toronto, Canada. The STSC net has multiplexers in Chicago, Los Angeles, Montreal, New York, Ottawa, Palo Alto, Philadelphia, Toronto, and Washington, and provides in-Wats service from any location outside local dialing of those points. STSC's service is called APL Plus.

Large Data Bases

Under either APL Plus or Action/APL, the user is able to work with large data bases and is not limited to the 32K "workspace" of conventional APL. The files under either system can be accessed sequentially, directly, or through data keys.

In its announcement of APL Plus [CW, June 17], STSC said that it could handle files up to 200 million characters long. A spokesman for Action/APL said that there is no limit to the file size that their system can handle.

Two CPUs or One

One difference in the philosophies of the networks can be seen in data base handling. Under APL Plus, all locations of a user are working directly with the same CPU and the same data base, updating it on a real-time basis.

Users with locations on the east and west coasts operating under Action/APL will be directed to different CPUs and will be updating two data bases independently. A spokesman said that cross-updating of the data bases is expected to be operational on an overnight basis by the end of the year.

The Action/APL people point to the fact that with two systems, their users are assured of back-up through phone links to the second CPU in case of a machine malfunction.

The operators of the APL Plus network claim, however, that they have an average of 11 weeks between crashes and an average of only 10 minutes outage per crash.

In another difference, Action/APL said that though they do not provide users with service beyond the areas local to their specified cities, neither do they have to include the cost of the blanket In-Wats service in their charges, as APL Plus inevitably must.

Rates

Action/APL said that it would "probably" develop a nationwide price schedule in time, but for the moment there are differences between the East and West Coasts.

On the East Coast, the basic plan requires no initiation fee, no monthly billing minimum and no prepayment. Charges are developed at the rate of $8/hr for connect time, and 8 cent/sec for CPU, and $1/track per month for mass storage.

Action/APL's West Coast plan has a $100 initiation fee, no monthly minimum, and for Los Angeles, $10/hr for connect time, and 10 cent/sec for CPU and $1.75/track per month for storage, with various "free" units to dilute these charges. In San Diego, the connect time charge is $11/hr; in San Francisco, $12/hr.

APL Plus uses a basic rate structure of $12/hr connect time and 10 cent/sec for CPU time, with no initiation, no monthly minimum.

Proprietary Computer Systems Inc. is at 16555 Saticoy St., Van Nuys, Calif., while The Computer Company is headquartered at Seventh and Franklin, in Richmond, Va.

Scientific Time Sharing Corp. is at 2101 S St., N.W., Washington, D.C.

Most Important Business Applications Included in CCI Minicomputer Package

ENGLEWOOD, Calif. – Installations planning to use a minicomputer for business data processing can get virtually all the major applications in the Minicomputer Business Package (MCBP) from Computing Corporation International (CCI).

MCBP consists of 30 programs which perform accounts receivable, accounts payable, payroll and labor distribution functions. The package also provides inventory control, general ledger and profit/loss balance sheets, in addition to the basic tools for file setup and maintenance, and information retrieval from storage.

One-Time Entries

CCI said that MCBP is designed for one-time data entries, with automatic carry-through to all affected applications, and automatic journal postings.

Data preparation is further simplified, the company said, through the acceptance of freely formatted information.

Predefined column positions are not required in entries from either a console or punched cards. The only limitation is that alpha entries must be surrounded by quote marks, and numerics surrounded by commas, a spokesman noted.

The package is geared for random accessing of data within disk files for systems having a DOS, thereby limiting the number of sort/merge operations required. It is possible to use the package with tape-oriented systems, the company admitted, but it wouldn't be particularly practical. It would reportedly take an estimated seven tape drives and vast amounts of time to operate with that configuration.

Program operation can be initiated conversationally from the control console or from card input. Data may be batched on disk or tape from any input device handled by the operating system, the firm said.

Fortran IV

CCI said that the programs in the package are written in Fortran IV and that the orientation is towards those minicomputers that use a 16-bit word. The programs have been implemented on a Honeywell 1648 time-sharing system, and could function equally well on a Data General Supernova, according to the company.

Core requirements of MCBP are largely a function of the DOS under which it is being used, but CCI said that 16K is probably the minimum storage needed.

MCBP is available to users on a lease basis for $14,000 plus the cost, if any, of adapting the package to a particular minicomputer.

The package is also available to minicomputer manufacturers, the company added, for a cost of $60,000 plus adaptation. Under this plan the manufacturer would be licensed to distribute free copies of the entire package to others.

Computing Corporation International is at 3375 So. Bannock.

Superset of GPSS/360 From Norden Added to National CSS T/S Library

STAMFORD, Conn. – Designers of model distribution, production, financial or transportation systems can use a refined version of GPSS/360, a general-purpose simulation system, on the National CSS Inc. time-sharing network.

Developed by Norden Division of United Aircraft over the past five years, GPSS/360-Norden is described as a superset of the original simulator package.

According to CSS, the new version enables users to develop and manipulate both simple and complex models through a series of special features including:

- Interactive debugging of syntax, assembly and execution errors.
- Enhanced data entry including the capability to establish independent data banks which may be shared by several models.
- Fresh approach to report generation through the use of a PL/1-like, free format compiler, which permits access to all GPSS entities and provides for arithmetic and conditional manipulations.
- Interaction during run time, allowing the user to control model execution and to modify the model by allowing communication in a natural language.
- Ability of the GPSS model to access programs and subroutines written in Cobol, Fortran, PL/1 and BAL.

GPSS/360-Norden service is available for 45 cent/sec for CPU-time (a 7 cent/sec surcharge over normal CSS service), $10/hr for connect-time and $1/thousand disk or unit-record accesses.

National CSS Inc. is at 460 Summer St.

Selected A/R Statements Run on Request

BURLINGTON, Mass. – Managers with medium-scale hardware capabilities can gain control over their customer accounts, with the Accounts Receivable system, according to the developer, Manufacturing Management Sciences (MMS).

The company explained that the system, developed to operate in 32K storage with two disk drives, provides improved control over accounts by permitting statements to be run on a selective basis and upon request, as often as the manager deems advisable.

Sales analysis and complete customer history analysis reports are available upon request to the system's users. All cash receipts are posted, and these can be applied by either the open-item method or the balance forward method. Automatic aging of accounts is also included, the company noted.

Simultaneous Updating

The system uses a file organization technique that allows simultaneous updating of customer master records and the accounts receivable file, rapid retrieval of data when desired, and the elimination of periodic file restructuring normally caused by overflow records.

Functionally, the system starts with a run that lists all entries, flagging those which are invalid, and includes a correction procedure to merge corrected data with existing valid data.

Separate registers are prepared for cash and for all other transactions as files are updated.

Aged trial balances can be run weekly, monthly or upon request. MMS said that the basic program provides a report by customer number aging all entries for each customer.

If another sequence is desired or if the trial balance must be printed selectively, another program is provided to handle these situations.

The accounts receivable listing provides a detailed report of all the transactions outstanding for a customer. This listing can be provided for the entire file or can be printed selectively, the company said.

Selective Statements

At the end of each month, or upon request, statements are prepared for all customers with open balances. The facility to produce these statements selectively is available, as is the provision for an aging line on each statement if desired.

The accounts receivable file is kept within reasonable size by a purge routine in which periodically all the transactions on the file that are in balance are transferred to a history file. The areas on the accounts receivable file occupied by the transferred items then become available for new transactions.

An inquiriy program is included in the system for retrieval of specific data from particular files on an as needed basis, and without the formality of a standard report.

The file structure includes, within each customer master record, an address that points to the corresponding detail records on the accounts receivable file. Using a chaining technique, the detail records for each customer are posted to the same data block, failing that to the same track, or to the same cylinder.

Records for another customer are posted either to the next physical cylinder, or to the cylinder that has the most space available. The company said that this is quite similar to the normal bill-of-materials processor.

Written in Cobol and implemented on a 32K 360 with two 2311 disk drives, the Accounts Receivable System can be leased for five years for a one-time $10,000, which includes installation, consulting, and user education (not to exceed 10 days), and guarantee against program defects for 12 months. Montly rental lease plans for shorter periods are also available.

Manufacturing Management Sciences Inc. is at 279 Cambridge St.

Wholesalers Speed Control of Distribution With DMIS

LOS ANGELES – Wholesale distributors can reduce inventories, obtain maximum cash discounts and monitor profit margins with the Distribution Management Information System (DMIS), available from the developer, Computerbase Corp., as either a service or a packaged system.

The same service is also available through accounting firms that are clients of Digitax, Inc. Under this approach, accountants are apparently tailoring the DMIS capabilities to fit the needs of various other businesses in addition to the distributors for whom they were originally intended.

DMIS is modular in concept and includes order entry, general ledger, accounts receivable, sales analysis, inventory and accounts payable subsystems. Within each of these subsystems, various routines are available, permitting the application to be adapted to the user's particular needs.

Designed to operate on a remote batch basis, the system can be adapted to operate on-line in a partition of a larger system, Computerbase said. However, a Digitax spokesman said that some of its DMIS clients have no in-house equipment, and are, instead, using the service on a conventional service bureau type of arrangement.

In any case, off-line communications to a printer on the user's location was selected, Computerbase said, in order to provide one-hour turnaround for picking and shipping documents produced by the order-entry system.

Documents with lower priority can be transmitted and processed by the computer center during slack periods, the company added.

Special Features

Generalized features have been included to adjust DMIS to the administrative needs of the distributor. A variable length product record allows unlimited price variations for a given product.

Priority customer ordering can be on a routine or "as required" basis and a customer credit limit feature is also available, to speed the order-entry cycle.

Manual overrides are allowable for specific items on a customer order, including commission, discount terms, unit or extended prices, and salesman number.

Physically, DMIS uses five data files, devoted to product, customer, vendor, salesman and inventory control. A sixth file of purged data is also carried as part of the system, for past year comparisons and as a permanent audit trail, the company said.

Computerbase said that it provides seminars for user management and all operating personnel.

The master record creation/conversion phase is performed under the guidance of Computerbase personnel, as is the initial operation and control of DMIS as it is performed in parallel with the existing system.

Cost of DMIS service from Computerbase is based on file sizes times the number of processings handled daily, plus number of orders printed.

A spokesman said that a small distributor with some 11,000 items on his customers, products and/or vendors files might expect to have a monthly billing of $1,500.

Digitax said that it would estimate the cost for each of its customer's clients at $10/mo.

Digitax Inc. is at 4010 Hemstead Turnpikc, Bethpage, N.Y. Computerbase Corp. is at 3435 Wilshire Blvd.

Plants To Have Data Bank

LIMA, Pa. – The American Horticultural Society received a $286,230 grant from the Longwood Foundation for a central data bank of America's cultivated and ornamental plants.

The grant will finance two years of a proposed 10 year project. The plant records center will be located at the Tyler Arboretum here.

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The Other Computer Company:

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It's an applications library of programs: business and marketing, curve fitting and regression, general education, electrical engineering, financial, general engineering, mathematics, mechanical engineering, operations research, social science, statistics, general purpose utility, general purpose scientific, etc.

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It's worth finding out more about: the H1648 Time-Sharing System. Buy or lease? Write Honeywell, Computer Control Division, Framingham, Mass. 01701. Can't use a whole one? Rent a piece of one. Write Honeywell, Information Services Division, Minneapolis, Minn. 55408. But whatever you do, consider the alternative. Consider Honeywell.

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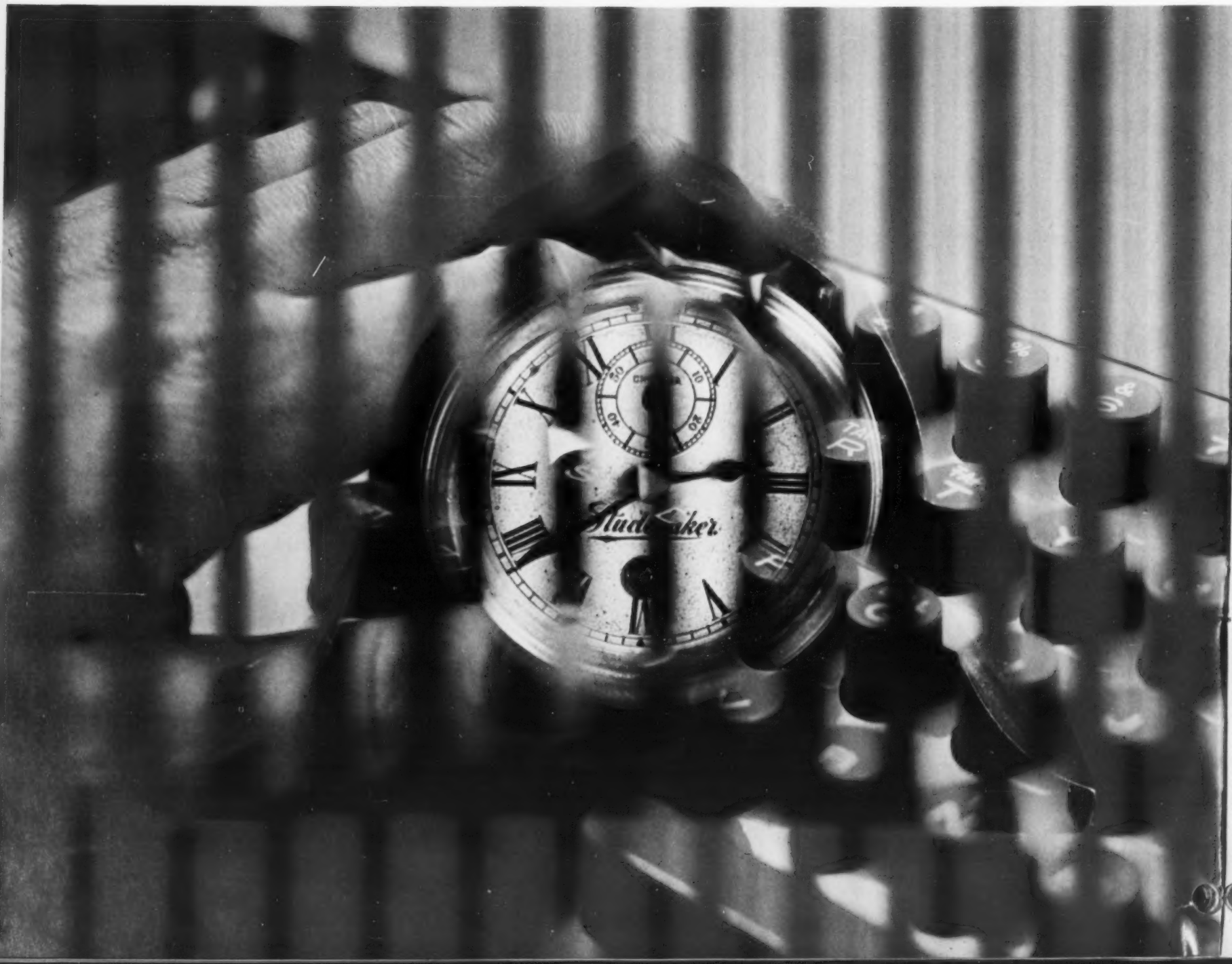
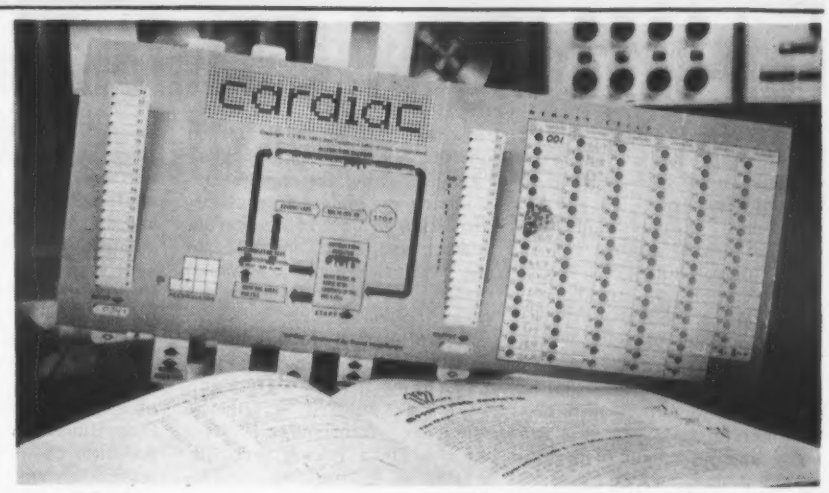


Bell System Offers High Schools Free Teaching Unit on Computers



NEW YORK – "Understanding Computers" – the fifth in a series of Bell System Aids to High School Science programs – will introduce students to "the computer age" via a do-it-yourself, cardboard computer.

Cardiac (Cardboard Illustrative Aid to Computation), a small, hand-operated, cardboard model computer, is one of the features of the new program – the first in the Bell System series to provide, among other items, student work kits for general class use.

Program materials are made available free to high schools by the 24 Bell System operating telephone companies.

Cardiac can be assembled in a matter of minutes. It has most of the equivalent parts of larger, digital computers – accumulator, instruction register, memory cells and input-output system – and a repertoire of 10 instructions, enabling it to solve some surprisingly difficult problems.

Designed to illustrate the operations of a computer and serve as an introduction to programming, Cardiac is accompanied by a 53-page manual which relates the device to faster and larger computers and leads the student through 10 programs, ranging from simple addition to complex computer game playing.

"Understanding Computers" was prepared by Bell Telephone Laboratories' Educational Programs and Exhibits Department with the aid of Bell Labs' technical staff and educators throughout the country. Cardiac was developed by Dr. David Hagelbarger, a member of Bell Labs' Information Processing Research Department.

For the high school teacher, the new program features "Understanding Computers," an introductory book by Dr. Thomas H. Crowley, formerly director of the Computing Science Research Center and now executive director of the Sentinel Design Division at Bell Laboratories.

Because of the rapidly increasing influence of computer technology on our daily lives – in business, education, communications, and even art, to mention only a few areas – it is anticipated that the "Understanding Computers" program will be of interest to business and social studies as well as to science and mathematics classes.

Other materials included in the computer program are:

- A 15 minute color film "The Thinking??? Machines," designed to create classroom interest and discussion.
- A vu-graph of Cardiac which provides the teacher with a step-by-step method of working out a simple problem with the class.
- Five silent super 8 mm film loops which are correlated with the Cardiac manual.

High schools may obtain information on availability dates for this free material from their local telephone companies.

ACM Group to Discuss DP and Publishing

NEW YORK – "The needs of editors and publishers are poorly met by today's typesetting methods. Increasingly costly and inflexible, they have yet to benefit from advances in computer and communication technology."

So said a representative of the Association for Computing Machinery (ACM), announcing the topic of one of the panels at ACM 70, to be held at the New York Hilton Sept. 1-3.

The panel which will discuss this problem and its future solution will consist of leading personalities in the printing and publishing industry, and will be moderated by Mrs. Margaret T. Fischer, manager of the information processing department at Time, Inc.

A prime requirement of editors and publishers of the 1970s will be for a total system which can exploit the potential of instant, worldwide communications to get on-line, on-demand customized information services to subscribers.

The system will be based on simple, inexpensive off-the-shelf equipment linked to huge data banks, simple standardized coding and easy error correction. It will make obsolete current methods of keyboarding, proofreading, layout design, graphic representation, press scheduling, advertising placements and production.

These will be replaced by linkage of multiple means of information input with straightforward editing and computer-aided page or book composition to provide multiple means of information output.

Also appearing in the ACM 70 industry sessions will be spokesmen for industries as varied as retail and food distribution, public utilities and heavy manufacturing.

Other ACM 70 speakers will include experts from all major computer manufacturers and leaders from computer-using fields and industries. Among them will be Ralph Nader who will set the keynote of the three-day conference with his opening speech on "The Computer and the Consumer."

Yuri M. Baykavski, of the USSR Academy of Sciences, will speak on Computers in the 70s.

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Fall Meeting of Common in Seattle Offers Talkfest

SEATTLE – Common, an IBM users group, has released the schedule of its Fall meeting, to be held here Sept. 9, 10, and 11.

Common officers said that items of special interest will be 1130 Cobol, 1800 RPQs, Model 20 applications, an introduction to System 3, 360 DOS special announcements plus PL/1, and 360 OS changes and options.

The meeting gives installation managers and experienced programmers a chance to chat formally and informally with IBM representatives and exchange information on new techniques and programs.

Wednesday Morning

The beginning of the meeting will be taken up with opening sessions and soundoffs, Common's term for open question and answer and discussion sessions. Soundoff topics include the 360/20, DOS 360, OS, the 1130, and the 1800.

Wednesday afternoon will open with an 1130 new user help session, an introduction to the Amtran language for the 1130, a discussion of 1130 time series analysis, 1800 RPQs, a panel on recent releases of 360 OS, and a discussion of the internal standards used by IBM.

The schedule for the second half of the afternoon calls for discussion and review of the 1130/1800 Fortran manual and the 360 DOS PL/1 programmers guide, data entry and display in a hospital DP system, the technical problems of teleprocessing, Fortran core dump, as well as panels on "Child Welfare and the Model 20" and the Systems Management Facility option of 360 OS.

Thursday Morning

Thursday will begin with a description of a construction estimating program implemented on the 1130, a panel called "Teleprocessing for Beginners," a session on budget forecasting, discussion of data processing education animation, and talks on the 360 administrative terminal system and teleprocessing maintenance planning.

Before lunch there will also be panels on controlling computer planning, 360 DOS and 1130/1800 publications gripes, a purchasing information system on the 20, a budget reporting system, an information retrieval system, new System 3 developments, and electronic circuit analysis. In addition there will be workshops for DOS users contemplating a switch to OS, and on coding PL/1 programs.

Thursday afternoon will start with responses to the soundoff sessions and planning discussions for the next meeting, which will be held in Miami.

Following there will be a 360 DOS BAL workshop, discussion of PL/1 Version 5, a panel on three dimensional plotting, a description of a large scale information system, discussion of the Scripp's Institute's use of the 1800 and 1130 at sea and 1130 Cobol and 360 DOS PL/1 workshop.

The schedule calls for Friday to begin with talks on installation management, retail inventory control, call statements in higher-level languages, publications management, interfacing a display terminal to the 1800, computer applications in undergraduate physics, and numerical control.

These will be followed by discussions of documentation aids, 360 DOS, 360 OS options, application of an information retrieval system, the IBM education program, evaluation of field engineering service, a time-sharing information retrieval system for small computers, sales analysis for the distribution industry, and new DOS release facilities.

The meeting will finish off Friday afternoon with an 1800 communications workshop, discussion of DOS-OS tradeoffs, results of evaluations of the 1130 Subroutine Library Manual and the 1800 Physical Planning Manual, a panel on installation management, and another Miami planning session.

FJCC to Have Panel on CAI

HOUSTON – When we bring computer technology into the educational process, we are confronted with such problems as integrating programming skills with competence in subject material, reaction of students to CAI environment, training system users, evaluation of effectiveness, and others. These areas will be explored in depth at the FJCC Nov. 17-19.

Three specific applications are: programmer training for educationally deprived students from urban ghettoes; measurement and development of pre-calculus mathematics skills for deaf students and teaching the "art" of computer circuit design to advanced college students.

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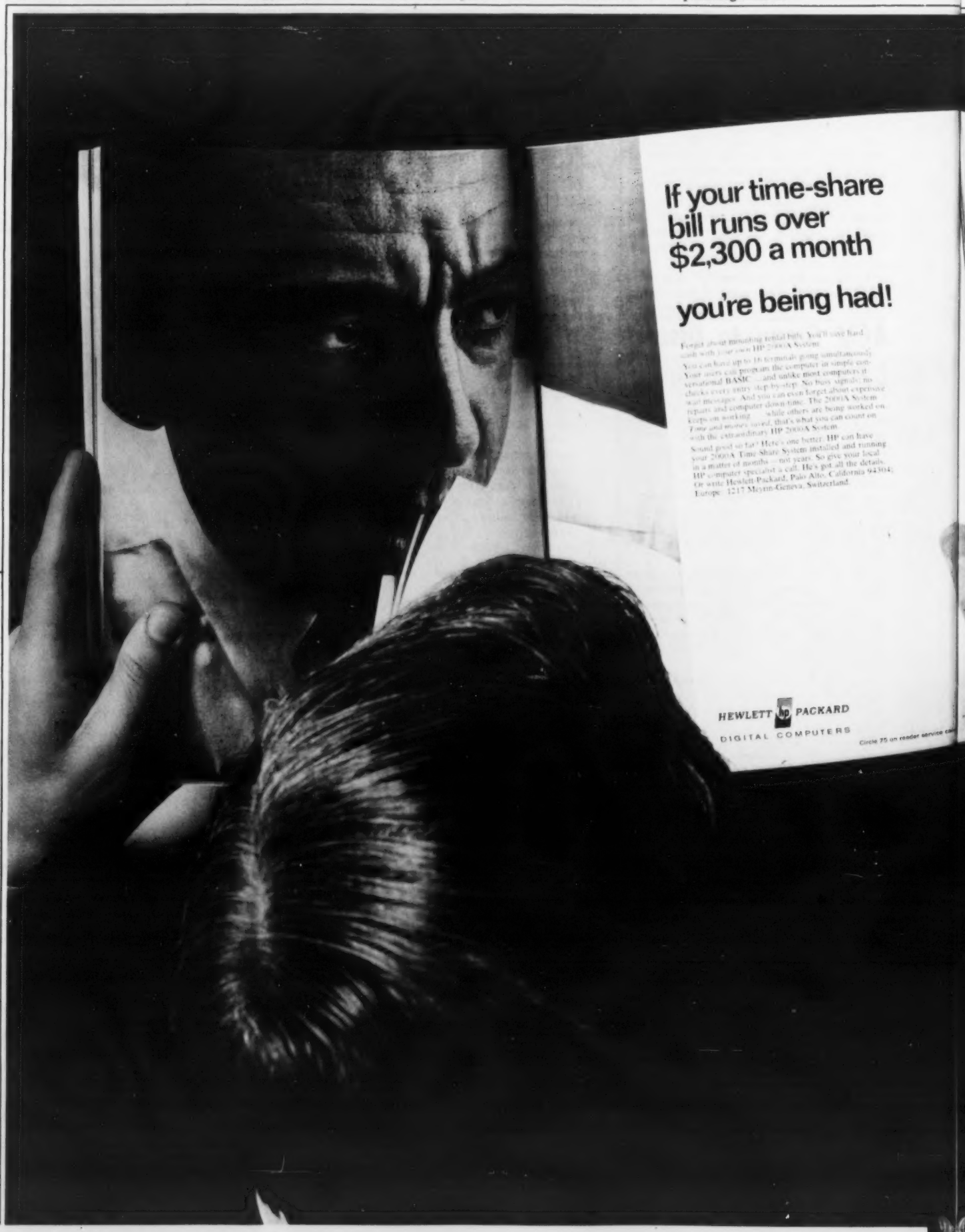

Montreal Picked As Decus Site

MAYNARD, Mass. – Montreal has been chosen to host the fourth Canadian meeting of members of the Digital Equipment Computer Users Society (Decus). Site of the meeting, which will take place on Sept. 17 and 18, is the Airport Hilton Hotel.

The Decus meeting will cover a wide variety of subject areas, including timesharing, education, data acquisition, biomedicine, process control, and computer-aided motion pictures.

Dr. Jack Moshman

SJCC Chairman Moshman Focuses On DP, Public Policy Interaction

WASHINGTON, D.C. – Dr. Jack Moshman has been named general chairman of the 1971 Spring Joint Computer Conference. The conference, sponsored by the American Federation of Information Processing Societies (Afips), will be held May 18-20 in Convention Hall, Atlantic City, N.J.

Moshman, president of Moshman Associates, Inc., a management consulting firm with offices here, is a nationally recognized authority on the use of computers in election projection and in the solution of management problems. He was an active participant in the formation of Afips in 1961.

"We plan to cover a broad range of subjects of direct interest to designers and users of hardware, peripherals, software, and related systems.

"In addition, we hope to examine a number of key areas where information processing systems interact closely with public policy and with our national well-being," he noted.

Commenting on the overall purposes and usefulness of the JCC's, Moshman stated: "It is essential that the conference reflect the day-to-day activities of the computing field and the real-world needs of key user organizations.

"While we will do our utmost to assure that the technical program, exhibits, and special activities are directed to these needs, we welcome comments, suggestions, and constructive criticism from all persons involved in EDP. Such input will receive prompt attention and should prove helpful in the formulation of our plans."

Correspondence should be directed to Moshman at Moshman Associates, Inc., 6400 Goldsboro Road, Washington, D.C. 20034.

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Afips Panel Reports on DP Professionalism

MONTVALE, N.J. – A summary report covering the discussion and recommendations of a roundtable meeting on professionalism in the computer field has been published by Afips Press.

Among the recommendations detailed in the report are the call for development of a broad, national certification program for computer personnel; the establishment of a code of professional ethics and public responsibility for the computer and information processing field; and the consideration of the formation of a special body to enforce provisions of the code.

Areas covered include:

- The development of standard proficiency tests covering positions in the computer field.
- The development of universal job descriptions to serve as the basis for such tests.
- Increased efforts in the areas of accreditation of private EDP schools.

Specific sections of the report are devoted to the need for protection of various publics and the general types of protection available, accreditation of educational institutions, a review of certification and standards together with recommended actions, a discussion of ethics including possible problem areas, a summary of general recommendations, and a bibliography relating to professionalism.

The meeting, sponsored by Afips, was held on Jan. 21 and 22, and was chaired by Willard Wirtz, former Secretary of Labor. Copies of the report, *Professionalism in the Computer Field*, may be obtained for $3 each from the Afips Press, 210 Summit Ave., Montvale, N.J. 07645.

FORTUNE, JUNE 1970

At least fifty U.S. companies today make minicomputers and 140 other firms turn out terminals. The field is one of great technological pioneering. For example, it is here that large-scale integration (LSI), the extension of microcircuitry beyond integrated circuits with component densities of up to 100,000 to the square inch, is finding its initial applications. Typically, a small new company, Four-Phase Systems, Inc., of San Jose, which was founded less than two years ago by Lee Boysel, then a twenty-nine-year-old computer designer, is challenging big established firms like Texas Instruments and Fairchild Semiconductor in the race to apply the large-scale integration concept to the making of small computers. Under one roof, Four-Phase Systems has assembled a group of young engineers and designers who were formerly with Fairchild Semiconductor, I.B.M., Control Data, and other companies—specialists in both large-scale integration and computer design. Cloyd E. Marvin, a Four-Phase vice president, notes that these disciplines "usually do not exist together in either computer-equipment companies or semiconductor houses." The company will soon start taking orders for a $15,000 computer.... Large-scale integration computers still have to prove themselves in a working environment. But their development is obviously setting the big-computer makers on their ears.

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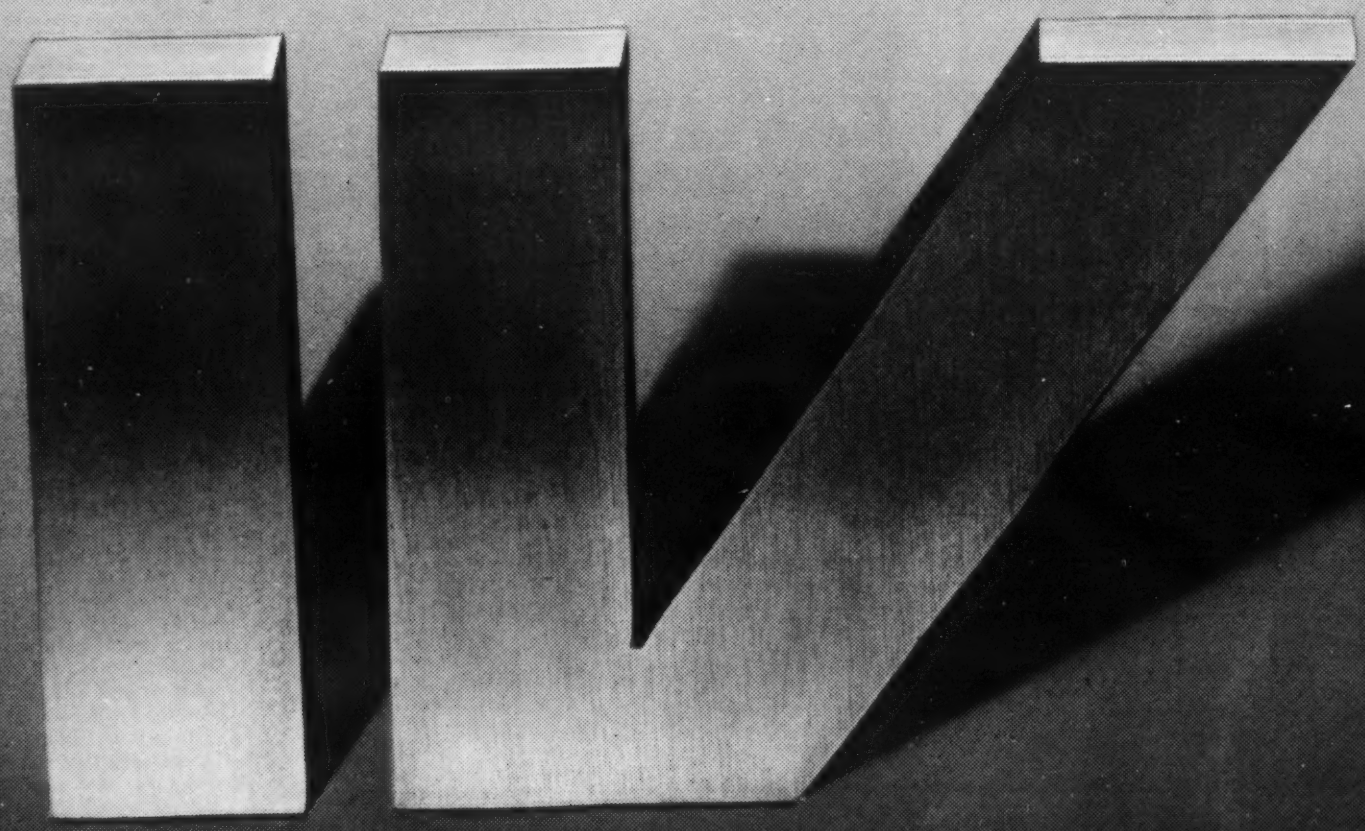

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NSF Supports Experiments to Evaluate Educational Impact of Minis on Campus

WASHINGTON, D.C. – Grants to support a 3-year experiment designed to evaluate the educational impact of a new form of computing equipment, the low-cost minicomputer, were awarded recently by the National Science Foundation.

The grants, totaling $398,400, were awarded to 10 colleges and universities and the the Southern Regional Education Board (SREB), Atlanta, Ga.

The SREB will provide the overall administration required to coordinate and report on the activities of the participating institutions.

Widely distributed geographically and differing in educational emphasis, the grantee institutions share a common problem with many other institutions of higher learning – the need for computing facilities to permit academic instruction in the use of computers.

Because of their great cost, computers generally have been available only to students at larger research-oriented colleges and universities.

Education

Minis Within Reach

However, recent technology has made available low-cost general purpose computing systems, or minicomputers, with purchase prices ranging from $12,000 to $75,000.

A college can now buy a minicomputer to perform a large number of educational computing functions, far more cheaply than it can buy off-campus computational services. Moreover, these minicomputers are expected to offer the colleges a wide variety of educational uses that previously were not available due to high costs.

The purpose of this experiment is to evaluate the advantages and disadvantages of this low-cost approach to instructional computing service.

Annual Reports

Reports on the findings and the costs per student for computing services will be prepared annually by the computer services project staff of SREB. New educational benefits will be evaluated for those institutions where a computer has been brought on campus for the first time. For institutions where a computer or computer service has been available, comparisons in costs and capabilities will be made.

The participating colleges and universities are contributing approximately $723,000 to the experiment in addition to the NSF grants.

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West German TV To Carry Course On EDP in Fall

By M.W. Martin
Special to Computerworld

COLOGNE, Germany – West German television is preparing a 26-part introduction to EDP in cooperation with the Bavarian and Hessian television companies.

Scheduled to begin transmission in November as a course in cooperation between the media in the series "Further Education," it will replace the basic course of the computer schools sponsored by industry and the trade unions.

Supplementary material will be compiled and published by a group founded especially for this purpose. The material will aid intensive television study by providing additional information and the stimulus for active participation on the student's part.

Students who successfully complete the course, which is divided into three sections, will receive a certificate entitling them to go on to a more advanced course.

NSF Grants Georgia Universities $523,800 for EDP

WASHINGTON, D.C. – Tne National Science Foundation has awarded 18 grants to expand and strengthen a statewide cooperative program of educational computing activities among institutions of higher learning in Georgia.

The grants will enable the University System of Georgia to extend the computing resources of the University of Georgia and the Georgia Institute of Technology to other institutions in the University System and one private college.

Educational Tools

This will greatly strengthen the educational tools available to both faculty and students at those institutions in the system which now have only very limited computing facilities.

The Foundation grants, totaling $523,800, provide support over a two-year period.

Educational institutions and the University System of Georgia will contribute approximately $1,855,400 to the project.

One Foundation grant for $233,200 was made to the University System of Georgia for partial support of a central staff of curricular experts and computer specialists who will provide the technical assistance and faculty training programs required to introduce the computer into the academic curricula of the participating institutions.

The project will initially involve the two major institutions and 21 participating institutions including 11 four-year liberal arts colleges, one college of medicine and dentistry, one private four-year college, and eight two-year colleges.

All will be serviced through a variety of computer terminals connected to the University of Georgia or the Georgia Institute of Technology. The latter two institutions are being awarded grants of $69,000 each for partial support of systems personnel or project troubleshooters.

15 Institutions

Fifteen institutions are being awarded independent grants in partial support of the terminal facilities necessary for participation.

These institutions are Abraham Baldwin Agricultural College, Tifton, $14,000; Albany Junior College, Albany, $14,000; Albany State College, Albany, $14,000; Armstrong State College, Savannah, $8,400; Berry College, Mount Berry, $15,800; Brunswick Junior College, Brunswick, $3,200; Fort Valley State College, Fort Valley, $3,200, and Georgia College at Milledgeville, Milledgeville, $14,000.

Also, Georgia Southwestern College, Americos, $14,000; Macon Junior College, Macon, $3,200; Medical College of Georgia, Augusta, $14,000; Middle Georgia College, Cochran, $3,200; Savannah State College, Savannah, $14,000; South Georgia College, Douglas, $3,600; and Valdosta State College, Valdosta, $14,000.

Other participating institutions are Augusta College, Augusta Clayton Junior College, Forest Park; Columbus College, Columbus; Georgia Southern College, Statesboro; Kennesaw Junior College, Marrietta and North Georgia College, Dohlonega.

Munich Updates School Reports

MUNICH, Germany – School reports in this city are being issued by computer, according to a United Nations Educational, Scientific, and Cultural Organization report.

The schools have been feeding student grades into the computer, which analyzes the marks for written work, exercises, and oral examinations. A report is issued on each pupil with his final class standing, and with one of 18 general comments on the student's performance.

The school staffs and students are reportedly satisfied with the electronic reports; the teachers because it reduces their work load, and the pupils because the computer is completely impartial, thus being "fairer than many teachers often are."

However, the teachers still reserve the right to check the decisions of the computer and, if necessary, to modify them.

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EUROPE TODAY

Issue 16. A ménage à trois in Europe for CDC, ICL and CII -- after months of saying we're only good friends, ICL (UK) and CII (France) admit to a serious flirtation but CII, with typical French coquetry, is also holding hands with CDC. EDP Europa Report examines the affair and the same issue takes a brief look at the Danish market.

Order your copy of EDP Europa Report Issue 16 now, at the non-subscriber price of $5, £1.75 (£1. 15s) USA, $3.35, £1.40 (£1. 8s) Europe, and have its full value accredited to an annual subscription for 24 issues $65, £27 if taken up within two months. Orders may be placed at either of the following offices.

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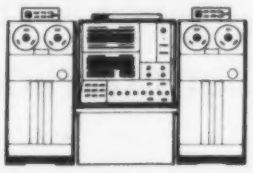

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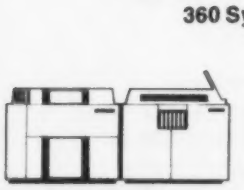

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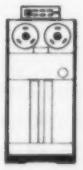

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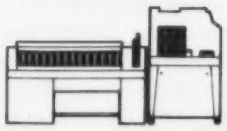

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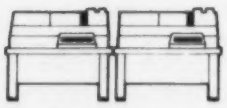

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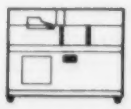

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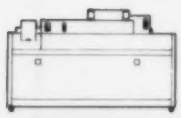

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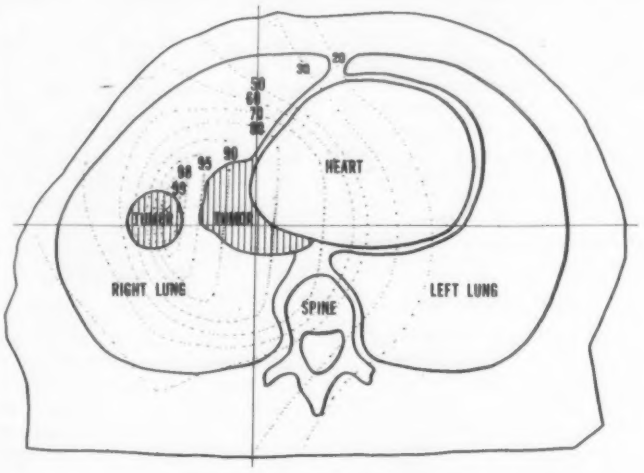
Plotter Plots Spot

Cancer Radiation Treatment Preplanned

PHILADELPHIA – Radiation treatment of cancer at the American Oncologic Hospital here is now being aided by computers and data communications. With the new technique it is hoped that better long-term survival of cancer patients will be possible because of more accurate treatment.

Together with the Institute of Cancer Research and Jeanes Hospital, the hospital formed the Fox Chase Center for Cancer and Medical Sciences in 1966 to create a total cancer center. The three institutions are located adjacent to each other.

According to Dr. H. Gunter Seydel, chief of radiation therapy at American Oncologic Hospital, optimum results in radiation treatment of cancer can be obtained by angling and rotating the source of radiation to achieve an appropriated method of attacking deep seated tumors.



Plot of patient with cancer of lung showing percentage isodose lines for distribution of radiation treatment.

"By planning the patient's treatment on a computer, the dosimetry may be refined before we treat the patient," Seydel explained.

The first step is to take X-rays to determine the size and location of the tumor. Then a strip of plaster is molded around the patient's body in the area of the tumor to show the actual contour of the patient.

This data, along with the amount of radiation required, the organs to be avoided, and the suggested treatment plan, are compiled by radiology physicist David Kusner.

The information is then punched on cards and entered into a Univac DCT-2000 data communications terminal located in the Institute of Cancer Research.

Consisting of a combination card punch, high-speed printer, card reader, control unit, and operator's console, the Univac DCT-2000 sends and receives information at speeds of 300 char/sec.

The terminal reads the data on the punched cards from American Oncologic at a rate of 200 card/min. The printer on the terminal can print out processed information at a speed of 250 lin/min.

From the DCT-2000, the information is transmitted over telephone lines to a large-scale Univac 1108 computer, operated by Satellite Computer Service, a scientifically oriented service bureau headquartered in downtown Philadelphia.

The computations take about three seconds to perform on the computer. The same calculations would require about 1,000 hours for a physicist to calculate to the same degree of detail.

The Satellite Univac 1108 then directs a special plotting machine to draw a diagram of the area to be treated. For example, if the tumor is to be within a 90% radiation dosage level, the plotter records that level and the additional levels of radiation around it.

After receiving the plot from a messenger, the radiation therapy team at the hospital evaluates the computer output and the other patient data.

If another treatment approach such as a shift in the axis of rotation is indicated, more data is transmitted and another plot drawn by the Satellite computer.

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Ranchers Have No 'Beef' With Cattle Feeding Plan

By CW Midwest Bureau

GARDEN CITY, Kan. – While it still may be considered difficult to lead a horse to water and get him to drink, in this prairie city they're leading cattle "with" a computer and getting them to eat.

Dave Babcock, comptroller for the Garden City Cooperative Equity Exchange, says his organization is not only getting the cattle to eat, it is getting them to eat the most nutritional feed at the lowest costs at any given time.

The Cooperative Equity Exchange, a rancher-owned cooperative organization, pens and feeds, along with its other activities, up to 12,000 head of cattle at a time.

NCR 100

Babcock, who developed the feed lot application, employs a newly installed NCR Century 100 in his cattle programs. The century 100 replaced an IBM 360/20. In the feed lot program, the data processing center receives information from the lot by pen.

Each pen reports the number of head of cattle in the pen, gross receipt weight of the lot, the average weight per animal calculations, and the data received.

For billing purposes, the pen reports the name and address of the owner or owners of the cattle in the pen. The exchange bills on a 15-day cycle giving owners the costs plus the gain in pounds each animal has achieved, showing the cost per gained pound.

The computer is fed daily reports from the pens on the number of head in the pen and the weight of the pen in animal pounds.

Another aspect of the feed lot program is the computerized blending of feed. The exchange's feed inventory is constantly being replenished, and the computer is fed data to calculate the proper blending of the feed to keep the nutrition as high as possible and the costs as low as possible.

"Computers could," said Babcock, "and do physically blend the grains in a dry feed operation by making the calculations and then opening the hoppers electronically."

The exhange now employs a wet feed system, Babcock explained, and the computer system, while calculating the blend, does not physically blend the feed. "It is not improbable," he said, "that our computer will someday physically blend our feed, even to allotting the correct percentage of moisture.

"With the computer system," Babcock said, "we can run a pen performance feed program." This program, according to Babcock, is a daily record of the effectiveness of the feeding program. "The computer can then judge the day's effectiveness," he explained, "and correct any faults in weight growth ratios."

Maximum Weight

The computerized feeding programs benefit the ranchers in the co-op by providing a means to obtain maximum weight in their cattle for a minimum cost. Since the co-op is rancher owned, the computerization provides a benefit by enabling the ranchers to have a feeding "tool" with an efficient and profitable operation.

Near implementation is another program for the ranchers which Babcock called a cattle forecasting program. This application would enable a rancher to forecast his profit potential on a given head of cattle.

Lists of Job Openings Kept Current By Network of 62 Terminals in Ohio

CW Midwest Bureau

CINCINNATI – A network of 62 CRT terminals on-line to a central computer in Columbus will provide current data on job openings in the greater Cincinnati area for the Ohio Bureau of Employment Services (Obes).

Called the Job Bank, the system is designed to make listings of job openings as current as the close of business the previous day. The information will be available to 62 agencies in the greater Cincinnati area concerned with job-placement programs. All 62 terminals will receive the same information simultaneously.

The terminals will be in Obes offices, in community agencies such as Pilot Cities Center, Opportunities Industrialization Center, the Hamilton County Welfare Department, and in neighborhood centers. Uniquely, the system will cross state lines by being available to Kentucky employment service offices across the river in Covington.

How It Works

Lewis Evans, Obes chief in Cincinnati, said employers will phone in job openings in Covington and Cincinnati. A day's collection of opportunities will be sent on-line from the Obes offices here to the computer in Columbus. Next business day, the new job listings will be displayed on the terminals along with other current openings.

When an employment counselor wants information on specific jobs on the display unit, he can telephone "job order control" for up-to-the-minute status of the position. If it is still available, he can send out an applicant.

The system, according to Evans, is being instituted statewide to speed up access to jobs and to provide greater exposure of openings to a broader labor supply. Cincinnati is the second city in Ohio to be included in the network. Columbus was first, opening last march, and Cleveland is scheduled to open next.

The system provides benefits to both employers, who find their openings filled faster, and to applicants, who don't waste time "hunting" jobs that are already filled.

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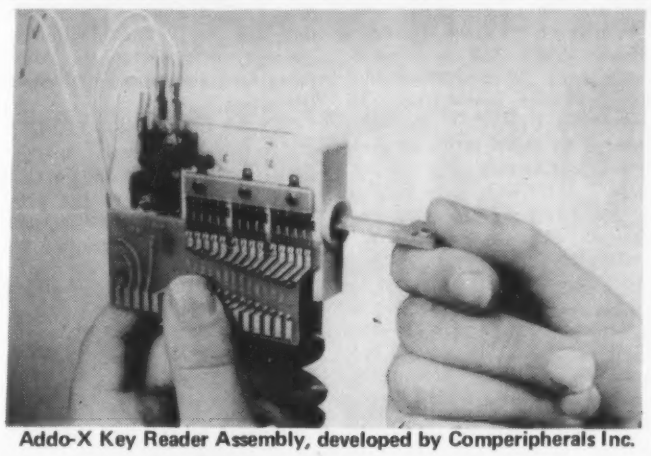

Addo-X Key Reader Assembly, developed by Comperipherals Inc.

Firms Offer Card, Key Systems for Data Security

By Edward J. Bride
CW Staff Writer

NEW YORK – Two companies have jumped into the growing market for protection devices for computer data or for computer centers processing the data.

Comperipherals, Inc. has developed a key reader assembly which protects time-sharing service bureau customers from intrusion into systems that may be processing data from competitive organizations.

The assembly, smaller than a person's hand, limits real-time computer access to operators possessing a properly coded plastic key.

Another system, installed at a brokerage house here, limits access to computer centers by using individual recognition and specialized functions.

Developed by World Computer Systems Engineering Corp. (WCSEC) of Dallas, the security system uses identification badges, each having discrete identification code numbers. All authorized numbers are kept in a magnetic disk memory file in a central control unit.

Both companies have responded to a growing need for protecting the innards of computer centers by increased security measures. The Comperipherals key reader assembly is intended for the OEM market, while the WCSEC system is intended for end users.

28-Bit Code to Computer

The key reader assembly works like a key lock. Only persons having a plastic key, probably encoded with up to 28 bits of data, can obtain a response from the computer.

A spokesman for Comperipherals stated that, heretofore, only expensive badge readers, such as those used to scan and verify credit cards, have been available to fulfill this function.

Ordinarily, any person capable of operating a remote terminal and knowing the correct digital response to the computer program can gain access to the data which the machine is processing. The key assembly, mounted inside a terminal, allows only a person having the right key to intrude.

Marketed for Comperipherals by the Addo-X OEM Sales Organization, the device allows for scanning in serial or parallel character format.

An Addo-X spokesman noted that the key reader would interest terminal manufacturers wishing to provide their customers with an additional form of data security. He also claimed that this device is a more economical alternative to badge readers in any type of system requiring secure input.

The Addo-X Key Reader Assembly, ordered in quantity, is available at $40 per unit, in three colors – yellow, red, and blue for both key and assembly block. Individual Key Reader Assemblies are priced at $56. Addo-X stated that delivery can

(Continued on Page 42)

IBM and Burroughs Offer Micrologic, But Warn Against Field Modifications

By Ronald A. Frank
CW Technical Editor

At least two of the major computer manufacturers now include variable micrologic capabilities in some of their systems, although both warn the user that hands-on modifications can be risky.

In admitting that the ability to modify instruction sets existed in some of their systems, both IBM and Burroughs told CW that logic modifications can be understood by only the most sophisticated systems-knowledgeable users.

They further emphasized that users should not attempt to do their own micrologic modifications because non-standard systems configurations would result.

However, the inclusion of variable micrologic could give the companies a future marketing advantage if they choose to exploit it.

An IBM spokesman told CW that the new 370/165 contains a Writable Control Storage designed to perform execution of instruction sets, maintain flexibility for emulation and other optional features, and provide microdiagnostic programs.

However, these uses are strictly limited to utilization by IBM for system configuration purposes and at no time should fall under user's control, the company said.

IBM apparently introduced the variable micrologic concept with the 360/25. In addition, the 360/85 reportedly has similar internal capabilities. In none of the systems has the company documented the use of micrologic in sufficient detail to allow users to modify their systems. IBM apparently believes that such modifications should be left exclusively to its own systems engineers.

Incompatibilities

IBM admitted that "users can and have altered microcode" but this changes the basic specifications of the machine which could result in hardware and software incompatibilities.

In a further statement the company said systems engineering business to alter the Writable Control Storage would not be accepted because microcoding is an integral part of the 165 and is therefore closely associated with the hardware.

"IBM will evaluate customer requests involving microcode only on an RPQ (Request for Price Quotation) basis," a spokesman said. Apparently such RPQs could not even be considered until after the first 370/165s are delivered.

In a prepared statement IBM said: "Users can and have altered microcode, just as they can and

(Continued on Page 42)

Sources Outlined to Aid Companies in Japan Trade

By E. Drake Lundell Jr.
CW Staff Writer

WASHINGTON – U.S. firms seeking to do business in the growing Japanese computer market [CW, Aug. 19] face tough sledding not only from growing Japanese capacity, but also from government regulations.

Already the Japanese computer industry has virtually sewed up the small-scale computer market there and is making strong inroads in the medium-scale range.

The major areas left for U.S. and other foreign manufacturers are in the peripherals field and in software and services, in addition to the already American-dominated, large-scale marketplace.

The Japanese Government, however, has strong regulations on foreign firms doing business in that country – regulations that serve to protect the growing domestic manufacturers but allow the introduction of technically superior products.

One method of domestic industry support comes from the Ministry of International Trade and Industry (Miti) which provides technical support, financing, and enforces standardization on domestic firms.

The other major regulations come from the Japanese Government in the form of tariffs and import quotas on imported products.

Most of the products in the computer industry are covered by quotas that range from 10.5% to 25% *ad valorem*, based on cost, insurance and freight (c.i.f.), the U.S. Department of Commerce said.

Digital computers carry an import duty of 15%; analog computers, 10.5%; and input/output equipment and converters, 25%.

Import Licensing Systems

In Japan there are three import licensing systems:

- Import quota (IQ) system.
- Automatic import quota (AIQ) system.
- Automatic approval (AA) system.

The IQ system is the most restrictive of the three. Digital electronic computers, parts, and accessories are licensed under the IQ system which requires that an Import Quota Allocation Certificate be obtained from Miti before the importer makes application for an import license from an authorized foreign exchange bank. After receipt of the Import Quota Allocation Certificate from Miti, the import license is then issued by the bank automatically.

Analog computers and most testing equipment are imported under the AIQ system, which also requires an Import Quota

(Continued on Page 42)

Wimmix Procurement Delayed Again; Project May Be Scrapped Completely

By Michael H. Blake Jr.
CW Washington Bureau

WASHINGTON – The once huge projected procurement of standardized computer systems for the World Wide Military Command and Control System (Wimmix) – a project estimated at $250 million when announced more than two years ago – may have passed away last week for all intents and purposes.

The original procurement plan calling for up to 87 medium-to-large-scale systems already has been pared to a very moderate program to acquire a minimum of 15 standardized computers, and even this modest project has stalled in the office of the Deputy Secretary of Defense.

A DoD spokesman said the procurement, for which requests for proposal (RFP) finally were expected to be issued last week, has been "temporarily delayed" while the department gives further study to the recently issued report on DoD to the President and Secretary of Defense by a blue ribbon defense panel, a 14-member body appointed by President Nixon to review the overall operations of DoD, including EDP equipment procurement and utilization. This is the latest in a long series of delays which have plagued the project.

Long-time Washington observer, Dr. Herbert R.J. Grosch, senior research fellow at the National Bureau of Standards, predicts that the project is "dead for at least a couple of years."

News Analysis

Grosch, who claims that the project was "technically poorly directed" from the beginning, feels that the idea of standardization is "good," but that the project was never directed correctly.

History Outlined

When originally announced late in 1967, Wimmix was a super-ambitious program calling for the installation of new computers at up to 109 locations around the world, including the National Military Command Systems. The number of computers was estimated as high as 100.

By last November, alfter a number of false starts, DoD announced a revised plan calling for the acquisition over the next two to three years of what it termed "a new family of standardized computer systems" and authorized procurement of a minimum of 34 computers with an option for 53 more.

The machines would all be medium or large-scale, with an estimated cost of $1 million to $5 million per system.

The Wimmix procurement was to have two major purposes in addition to the primary mission of providing needed computers for the military c&c apparatus: was to be the first stage in a standardization program under the responsibility of the Joint

(Continued on Page 42)

Wimmix Delays Laid to Optimism, Economy, Congress

(Continued from Page 41)

Chiefs of Staff, and it was to foster "extensive competition" between bidders, which would have included peripheral makers.

Last December, the Air Force finally announced that it was ready to move on the project and asked for letters of interest. A week later the Air Force mysteriously issued a terse announcement that issuance of RFPs for Wimmix would be delayed indefinitely.

After a period of confusion, DoD announced in June that a new plan had been approved. Deputy Defense Secretary David Packard said that, as a result, the Wimmix project would include procurement of a minimum of 15 new standardized computers, with an option for 20 more.

As part of the standardization effort, IBM's 360 was established as a "second standard." As a strange coincidence, 16 centers in DoD that would be covered by the new standardization effort already had 360s on lease.

"Depending on an economic analysis of each installation," DoD stated, "the currently operated IBM equipment may be purchased, continue to be leased, or replaced with the standard established by the new procurement. All new computers will be provided by the standard established by the WWMCCS competition."

Letters of Interest

In July, the AF sent letters of interest to some 30 firms. The next step was to be the issuance of RFPs to those companies that responded.

Consequently the original $250 million project had shrunk to a job in the $50 million range, and is now "delayed."

It's hard to discover the reasons for the delays in the over-ambitious project, but some factors are now apparent.

The project was a victim of over-optimistic planning and too many "cooks" from the beginning. On a project of the magnitude of the original Wimmix concept, everyone in the computer business wanted a piece of the action.

Undoubtedly, the military spending curbs were another major factor in the severe cutback in the scope of the program, and what now appears to be its demise, according to Grosch.

Congress Interested

In addition, there is a great interest in Congress over the military's computer procurement policies, and the military is still smarting over the Phase II 'fiasco' a few years ago (when a contract was originally awarded to IBM and then overturned and given to Burroughs).

It would be a minor miracle if the project is not scrapped completely – as it now appears to be. Possibly a limited version will come out of the present "review" but many guess that it will now be started again from scratch – putting any hardware purchases off for at least two to three years.

Japanese Market Seen Worth Entering Despite Problems; U.S. Aids Outlined

(Continued from Page 41)

Allocation Certificate. Under the AIQ system, however, these certificates are usually granted automatically by Miti.

Storage equipment, papers, inks, and other electronic data processing supplies and room equipment are freely imported under the AA system, which requires only application to authorized banks for authorized licenses.

One of the best ways for U.S. firms to enter the market is through Japanese trading companies (Shosha), a distinct Japanese business organization, according to the department.

Traditionally, Commerce said, there are two or three large Shosha that handle most of the foreign trade coming into Japan. However, the department notes that there are a growing number of small firms competing with the traditional Shosha.

Often these smaller firms can do as good or better job for American firms entering the market, and some firms have had "very good" experiences with the smaller companies.

A major factor for success in the Japanese market will be the ability to extend credit to buyers, Commerce declared. This ability can give American manufacturers a definite competitive edge over other foreign firms and the Japanese themselves.

Sources of Funds

If a company cannot finance its entry into this market through its traditional banking services, the department noted that there are many other sources of funds available to back the entry of U.S. firms into foreign markets.

For example, the Export-Import Bank of the U.S. (Eximbank) will offer export credit guarantees to commercial banks to finance export sales. The Eximbank also will offer direct loans for large projects and equipment that require long term financing, Commerce contended.

Another source of funding for U.S. firms planning to penetrate foreign markets is the Foreign Credit Insurance Association (FCIA), which offers export credit insurance for foreign ventures.

While the problems of trading in Japan are more severe than in many other markets, the rewards seem to be worth the effort now that Japan has become the number two computer user in the world.

The Department of Commerce said that it will aid any U.S. firms seeking Japanese business either through any local field office or through its Bureau of International Commerce in Washington, D.C.

Former IBM Employee Held In Case of Missing Parts

POUGHKEEPSIE, N.Y. – A former IBM employee, now a salvage dealer in nearby Kingston, has been indicted for perjury and theft in connection with alleged black-marketing of IBM keypunch parts.

Philip Reilley, owner of P & D Surplus, is charged with perjuring himself by telling a Dutchess County Grand Jury that he did not receive or sell new IBM starwheels.

His testimony before the Grand Jury in May came as the result of an IBM complaint. The indictment implicates Reilley in the disappearance of "in excess of $500" worth of the IBM parts.

An IBM spokesman stated that the Poughkeepsie plant was the only location involved in the disappearance of "various mechanical keypunch parts," including starwheels.

Reilley's attorneys were unavailable for comment regarding their plea, or any other aspect of the charges.

New York state laws concerning "receiving" stolen property include actual theft, acceptance, possession, or resale of the goods.

Rosenblatt alleged that the starwheels ended up on the black market, where they were sold at a fraction of their original value.

He would not discuss the details of the case, other than commenting that it is the result of "one of the most intensive investigations ever conducted by this office in conjunction with the State Police."

The named part is used to sense holes in control cards on keypunch machines, and several hundred were probably involved. The parts are small enough to be smuggled, several at a time, in shirt or trouser pocket.

Dutchess County District Attorney Albert M. Rosenblatt indicated that an investigation had been going on for "about six months" before the sealed indictment was handed down at the end of July.

He said that he is ready to prosecute the case but that Reilley would not come to trial until the defense had prepared its side.

No Computers in Court

He added that visions of hauling computers or keypunch machines into court would not materialize. "Our disclosure proceedings in New York aren't quite as broad as elsewhere," Rosenblatt noted. He said that all evidence would not necessarily be presented to the defendant's attorneys prior to trial.

IBM spokesmen suggested that Reilley's previous employment by the company was incidental to the current charges. "It was many, many years ago," a spokesman said.

Companies Offer Card, Key Systems for Data Security

(Continued from Page 41)

be made in 90 days.

Hollerith-Card Badges

The physical access-limiting system is called Computerized Safeguard Against False Entry (Comsafe), and it uses Hollerith punched cards to grant access to controlled areas.

The present system can utilize up to 24 remote inquiry stations, and Comsafe developer Kenneth A. Yarbrough said that modification in design would permit further expansion.

The first Comsafe system was installed at Salomon Brothers, the financial brokerage house, at their new facility at One New York Plaza. It uses nine inquiry stations.

Each inquiry station addresses itself to a discrete logic block in the central control unit, allowing independent operation of each station regardless of the operation of other stations.

Badges are withheld by inquiry stations when entry is sought. After checking for authorization, the station releases permissible badges and, depending whether set for "manual" or "automatic," can open the door for the authorized person.

Rejected persons have their card withheld permanently, unless released by a central control unit operator.

There are a possible nine levels of authentication, so that all authorized personnel could be allowed into the main entrance, but only certain personnel would be permitted into tape libraries or cash booths.

Another function will add a signal from an electronic clock as an additional requirement in the verification logic, providing the capability to limit access of various identification numbers to designated times of the day.

WCSEC is a subsidiary of World Computer Corp. Comperipherals is at 437 Madison Ave., N.Y.

Manufacturers' Micrologic May Give Marketing Edge

(Continued from Page 41)

have altered hardwiring, but this changes the basic specifications of the machine. Such changes would create a non-standard machine which could result in hardware and software incompatibilities, and the user could be subjected to increased maintenance costs."

A Burroughs spokesman told CW that the company originally introduced the equivalent of micrologic in 1967 with the introduction of the TC-500 terminal computer. Since then the TC-700 and the recently announced L series of small computers, the L2000, L3000, and L4000, have been introduced with a similar capability.

Originally Burroughs referred to this feature as "firmware" which actually was a "string of microinstructions." This capability apparently was later renamed micrologic in keeping with current industry terminology.

The spokesman said that the desire and ability to alter the instructions in a Burroughs system is limited to a few highly sophisticated users. In such cases the company has provided systems engineering support and, working closely with the users, has provided micrologic modification to a small group of customers.

When such modifications are made, a flat fee of $2/instruction is charged. The spokesman stressed that the users would be ill advised to attempt such changes on their own since this could conceivably result in a non-standard configuration that would interfere with later maintenance problems.

Burroughs is currently planning additional devices with the variable micrologic capability, but none with the exception of those above have yet been announced.

One firm, Standard Computer Corp., encourages its users to modify its microcode – to an extent. The firm offers courses in microcoding and will aid firms in developing microcode.

However, Standard said that if a firm "extensively" altered its microcode beyond the development of a new "target level" language it "would probably not support it."

Many of the minicomputer manufacturers also employ micrologic to some extent, but in general have not encouraged users to alter the code.

If either IBM or Burroughs should decide to provide users with the necessary detailed documentation to encourage customer-originated system modifications, this would undoubtedly give them a very real marketing edge over competitors who were unable to advertise the use of variable micrologic, simply because it was not included in their delivered systems.

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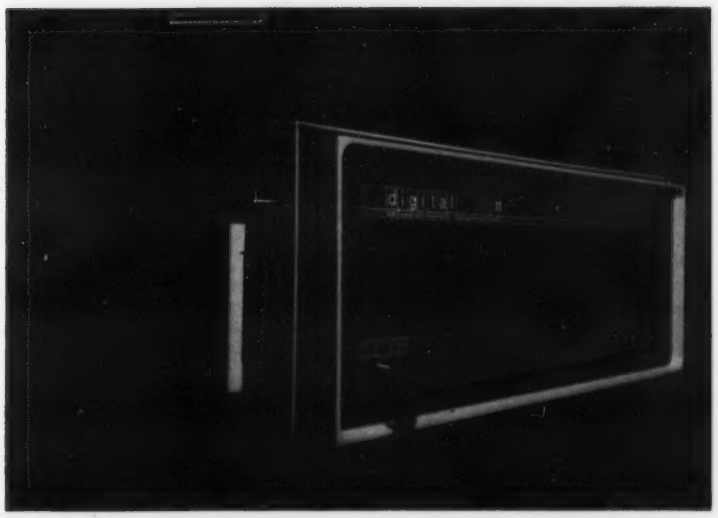

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The Great Memory Debate—Part IV

Holographic Memories Could Make Others Obsolete

A sample holographic plate, upon which the laser beam is focused, is used to demonstrate the output produced by laser-generated holograms in the IBM experimental optical memory system. For illustrative purposes, the pattern of the hologram is projected on a piece of ground glass.

By Peter L. Briggs
CW Technical Research Editor

While core, plated wire, and semiconductor memories are now locked in a life and death fight for the memory market, they may all be obsolete by 1980.

The challenger waiting in the wings that could have the same effect on the memory business that integrated circuits had on vacuum tubes in central processors is the optical or laser memory.

Dr. Frank Marchuk, president of Marchuk & Metcalf Associates which owns Computer General, predicts that his firm will have optical memory business worth $1.2 billion as soon as 1974.

And, he notes, this is the same volume of business predicted by IBM for its share of the optical memory business.

Presently, Marchuk claims that his firm alone has commitments worth $142 million with 40 of the orders on a firm basis for optical memories and computers.

Potentially the optical or laser memories promise to offer the best performance and largest capacity for the smallest price of any currently considered type of memory equipment, proponents say.

Marchuk claims that one Computer General 100 optical computer can replace 10 Control Data 6600s and that a memory can be kept in a 20 ft by 20 ft room whereas a conventional system with equivalent storage would require a 10 story building on a 150 ft by 150 ft lot.

In addition, Marchuk says that tests at Computer General have shown that the memories will last up to 100 years. He says that they now project a 100% performance with no degradation for 25 years and a total 100-year lifespan.

2 Types of Laser Memories

There are actually two very different approaches to applying the laser to the data storage problem. The first uses the laser as a mechanical device either to burn holes in a film surface or to expose such a surface to the light produced by the laser itself.

The second uses one of the most complex, and potentially valuable, properties of a laser, the hologram.

Precision Instruments, Foto-Mem, and some other firms have already announced devices in the optical laser class. In general, these devices capitalize on the fact that a laser beam can be directed very accurately and can produce enough heat either to burn a hole into a metallic surface or enough light to expose a photo-sensitive surface under controlled conditions.

The major problem with any of these approaches, and the problem that will make them, at best, only temporary solutions is that the device requires tremendous mechanical ingenuity to handle the film surfaces and to locate the right film in a pack of such films.

This problem, one that is familiar to the IBM 2321 Data Cell user, means that the insides of the unit look like something out a Rube Goldberg nightmare, rather than a slick piece of modern engineering. Moving chains, belts, plates, drums, and an illuminated laser beam make the whole approach look like Buck Rogers.

Not only does the unit look messy, it is messy. The inherent mechanical, electrical, and optical problems in having huge masses moving around are so great that the idea of maintaining such a unit gives many customer engineers a headache.

Storage Density Problem

The other inherent problem in this approach is caused by the demand for extremely high capacity. Users have indicated that they can only justify the cost of such units if they can store everything they own in a single unit.

This means that the positioning of the laser beam, the alignment of the film, and the other machinery in the unit must be machined to absolute precision. Even then, there are many errors in reading and writing. These errors require that the expensive circuitry be included to recover from errors and to detect the occurrence of an error.

Precision Instruments has solved this problem by having what is really two units of about equal cost – one is the laser memory and the other is the error handling circuitry.

These devices deserve credit for being the first, admittedly crude, applications of this new optical technology to the memory area. They do work within reasonable tolerances for applications that absolutely must have the multimillion character storage capacity that they can provide and nothing else can come close to offering.

There Is a Better Way

However, there is this other property of laser (or coherent) light that is caused by its being all in the same phase. This property, defined as coherency, says that all the waves will have peaks and valleys at the same point in the light beam.

If you take two such beams, one as a reference point and the other reflected of an object to be photographed, the resulting interference between the two beams produces what amounts to a photograph.

This "photograph" is called a hologram, and has several properties that are unique. Any portion of the resulting hologram will, when illuminated by a laser light source, produce the entire image photographed by the original lasers. The redundancy factor is enormous.

All that happens when you use a smaller portion of the laser is that the image becomes less than clear. This works only to a certain point, of course, before the image becomes undecipherable, but this point is so small that the capacity of a single square inch of ordinary photographic film is on the order of millions of characters of information.

A piece of film that small need not be moved at all. It is simple enough to build integrated-circuit detector arrays behind the film that sense the pattern of light recorded in the hologram. The light need never be moved, because the entire holographic image is reproduced by illuminating a single spot of film.

If more capacity is required, the number of illuminating lasers need not be increased. All that is needed is that the existing laser beam be split through the use of prisms, into several beams. Increasing the capacity of the unit requires the addition of a slight amount more optical gear but really requires no major investment in additional hardware.

The basic cost of a holographic memory is lower than the cost of mechanical equipment, and the cost of maintenance is very low because there are no moving parts. Reliability is high, again because there are no moving parts. Data storage capacity is nearly unlimited, because the capacity of a holographic recording is enormous. Access time is very tiny because there is nothing that must be found. All the work is done by integrated circuitry, without moving media to wait for.

Researchers now working with holographic memories claim that one holographic memory the size of an average office desk will have the capacity of all on-line storage in use in the Western world.

The desk-size holographic unit, with several 100 trillion bits of storage, would exceed the capacity of all of the disks, drums, and core memory now in use, they stated.

Remaining Problems

Both techniques, the holographic and the laser/optical, have major problems yet to be solved. Neither technique solve the update, or rewrite, requirement. It is not easy to write over data once it is written. The major computer manufacturers, RCA, IBM, Honeywell, etc., are trying many different solutions to this problem. RCA has announced a technique that might permit erasable holograms. Xerox and Kodak are both playing with other techniques to do the same thing. IBM's Watson Research Labs are, among other things, busily trying to produce a workable holographic memory and an erasable hologram.

IBM has been very busy in this area, and has a working laboratory model of an non-erasable holographic memory of large capacity and very rapid access time (16 million characters with 50 nsec access time)[CW, June 10].

No real solution has been produced yet commercially. It is very unlikely that there will ever be a solution to this problem for the laser/optical memories because there is no obvious way to remove a hole in .a metalic surface, once it has been burned.

The mechanical systems that are working with exposing photographic film might be able to use an erasable film, but the mechanics of writing with a laser are as complex as reading, if not more so. The very limited update capability available with present equipment costs more than the read system, complete.

Another problem is the price/availability of lasers themselves. Though they are now down in price to the low thousand dollar category, they are not producible in large quantities by the present manufacturers.

It is very likely that if IBM really offers such a laser memory system it will become, almost *de facto*, the largest manufacturer and user of lasers in the world within three to five years. This is the same situation that IBM is already in regarding semiconductor circuitry and components.

RCA already has some of the technology necessary to manufacture lasers, as does Kodak. It will, however, require a major investment to produce them in large enough quantities to justify a low enough price to satisfy the customer. IBM does have several advantages in large-scale production and in modern production technology over all the other major manufacturers, and these advantages will probably work in IBM's favor very quickly after the devices start becoming available.

Not Now, But Soon

Holographic memory that can be both read and written will not be available this year, but it will very probably be available within three years. It will offer users multitrillion character storage at ridiculously low prices, prices probably less than one-thousandth of what they are currently paying for large-capacity disk storage.

Users will be able to access these enormous data storage systems at, literally, the speed of light. Light, which travels at about 14 in./nsec, will make access times below 20 nsec/character or/word or/whatever feasible within five years. It is possible that such memories may be sufficiently faster than the best central processors that they can efficiently serve serveral large CPUs at once, or several thousand terminals at once.

Users have indicated that they really don't have any idea what impact unlimited memory might have on their DP applications and system designs, but they all agree that the whole way of using a computer ought to change when the storage of data is no longer a factor, and when the access speeds are as fast as the central processor, itself. Such changes will occur, and they will take time.

However, the computer industry has always been able to take advantage of new techniques as soon as they become feasible. It is geared up to seize new opportunities, and as soon as the breakthrough comes with erasable holographic memories they will come into wide use within 12 months, proponents say.

So while the present memory technologies debate and fight for the market, they had better keep an eye out for the research being done on holographic systems or they may find themselves in the position of vacuum tubes in the computer business.

This fourth article on optical memories in "The Great Memory Debate" is necessitated by reader interest.

Originally we planned four articles, one on core, one on plated wire, one on semiconductor, and a wrapup piece, but reader interest has led us to add this article on the emerging laser or optical memory technology.

The article was prepared by Peter L. Briggs, CW Technical Research Editor, from CW files and personal interviews. He was aided by Phyllis Huggins of the CW West Coast Bureau, who interviewed Dr. Frank Marchuk of Computer General for the article.

The next and final article in the series will examine the memory technology field from the point-of-view of unbiased witnesses.

New Feed Ingredients

DECATUR, Ill. – Two new feed ingredients with special nutrient properties for poultry, swine, and cattle have been introduced by the A.E. Staley Manufacturing Co.'s Agri-Products Group.

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And if you'd like complete information on all three Friden digital printers, ask Mr. Gary Dotzler, Sales Manager, OEM Products, Friden Division, The Singer Company, San Leandro, California 94577.

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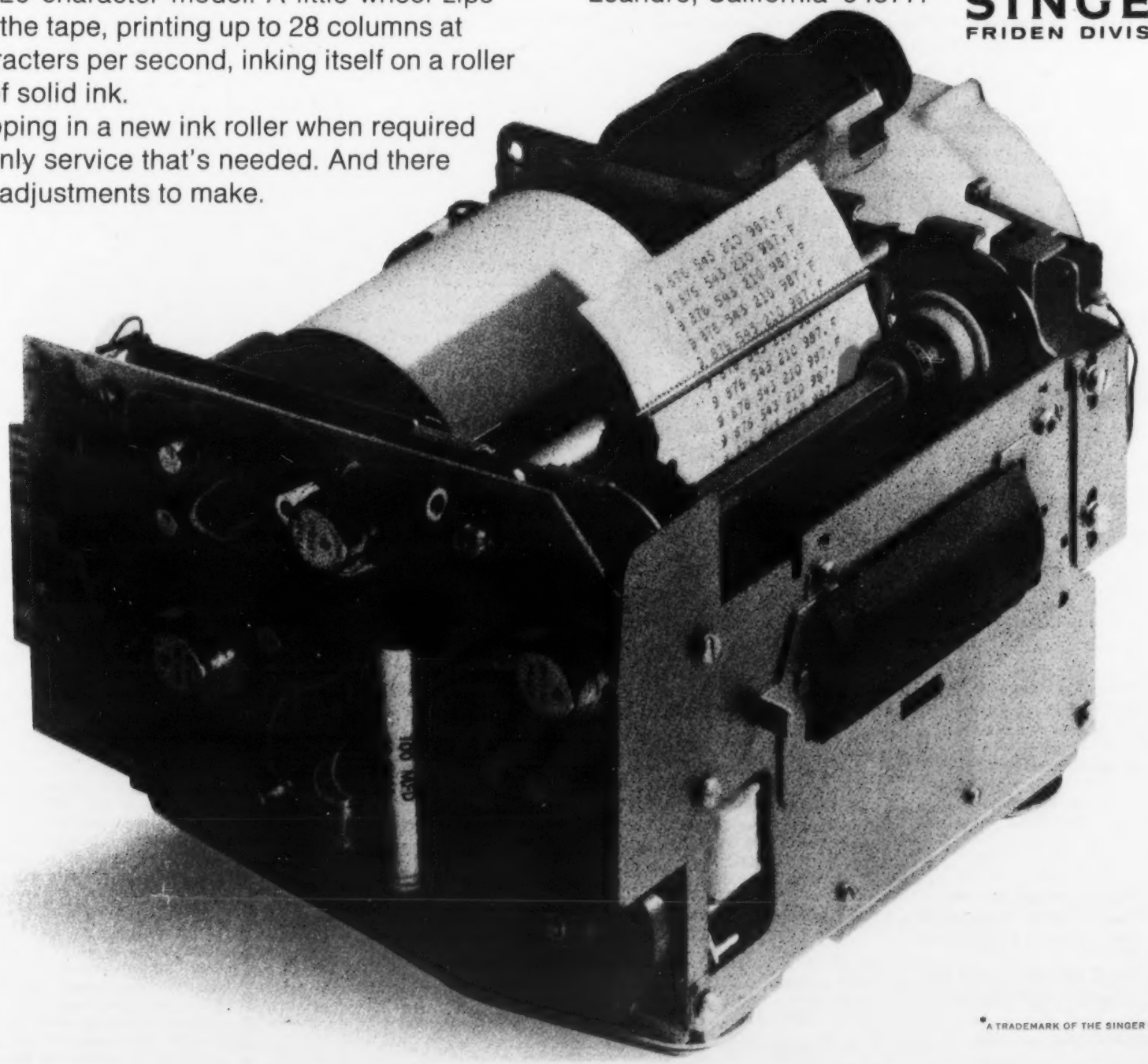

*A TRADEMARK OF THE SINGER COMPANY

Ann Arbor Terminals AAT-101 Device Can Drive Up to 10 Television Monitors as Low-Cost Displays

ANN ARBOR, Mich. – A display driver that enables the designer to make use of a low-cost CRT in his display is available from Ann Arbor Terminals.

Called the AAT-101, the 4-1/2 in. by 8 in. by 1 in. device reportedly can convert any television or 525-line monitor into a 256-character alphanumeric display.

It provides, according to the manufacturer, 256 characters of refresh memory, video generation for 64 Ascii characters, all synch timings and TV modulation.

The modulated output connects directly to TV antenna terminals and can drive up to 10 sets, according to the company. The composite video and the separated synch signals are brought out for use with video monitors and cameras.

Memory I/O is 6-bits parallel at TTL levels. Data can be loaded, read or exchanged asynchronously at rates up to 120 char/sec. The memory can be clocked externally for burst transfers at character rates between 10 kHz and 2 MHz, the company said.

Described by the manufacturer as a versatile system, the AAT-101 is said to be applicable to a variety of uses such as data acquisition systems, computer peripherals, communications terminals, key-tape units and others.

The AAT-101 is immediately available on a 15-day delivery schedule. It is priced at $695 in lots of 2 to 4, decreasing to $445 in lots of 100 or more. The unit price is $825.

Ann Arbor Terminals is at 918 Greene St.

Resistor Said to Meet Military Standards

CORNING, N.Y. – Corning Glass Works has introduced a new miniature precision resistor for use in special computer circuits and in military applications. Called the NC3 (military classification RN50C), the NC-style resistor meets standards of MIL-R-10509F, Characteristic C.

Slightly more than half the size of the Corning NC4 resistor, the NC3 is said to have a temperature coefficient of 50 ppm and is rated at 1/10 W at 70°C or 1/20 W at 125°C. Tolerance is 1%. Its resistance range is from 49.9 ohms to 100K and it is rated at 200 V.

NC3 pricing is quantity dependent and ranges from $2.05/ea. in quantities of 10 to 24, down to $.32/ea. in orders of 1000 or more.

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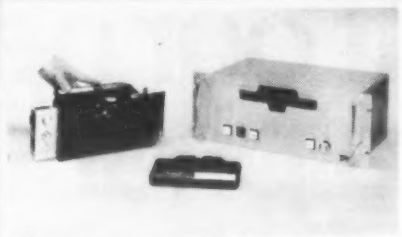


Shown here are the long-term magnetic tape cartridge event recorder Model DPM-511 recorder (left) Model DPM-521 reproducer (right) and MRC-100 cassette (foreground), and shown being inserted into the reproducer.

Recorder Unit And Reproducer Shown by 3M

CAMARILLO, Calif. – Long-term magnetic tape cartridge event recorders, which can log up to 35 continuous days of digital data for subsequent computer analysis, and a companion rapid playback reproducer have been developed by 3M Co.

The equipment utilizes a magnetic tape cartridge, similar, except for size, to the cassette which has become a popular medium for magnetic recordings.

The new DPM-511 Long Term Event Recorder provides up to 35 days of continuous recording on a single cartridge. The DPM-521 Reproducer will play back a complete cartridge in two minutes, yielding a write-to-read time base compression of up to 25,000 to 1.

The recorder and reproducer provide four data tracks. If required, one track can be used for timing information. Time pulses can be supplied from an external clock or an optional internal clock. The optional clock generates a pulse at 15-minute intervals.

The DPM-521 reproducer provides all status and control lines required for remote operation. Options include bi-directional read, tape cleaner and local control.

The MRC-100 magnetic tape cartridge contains the tape path mechanism, including two flanged bearing-mounted reels, tape guides, pinch roller and reel braking. Beginning-of-tape and end-of-tape sensing reflectors are a standard part of the cartridge.

List prices are: DPM-511 recorder, $3,400; DPM-521 Reproducer, $2,100; MRC-100 cartridge, $30 each.

The firm is at 300 South Lewis Road.

Magne-Head Broadens Mass Memory Line To Eight Systems

HAWTHORNE, Calif. – The Systematics/Magne-Head Division of General Instrument Corp. has broadened its line of mass memory drum systems.

The full line includes eight different single-drum systems with capacities ranging from 10 to 150 million bits, with 256, 512, 1024 and 1536 tracks – each with its own read/write flying head.

Called the SA 7000 Series, the drums feature a stand-alone design, turntable mounted to give full 360° access to all circuits and checkpoints from the front.

They include all data electronics with a bit serial interface to user's controller. Optionally, controller logic can be provided to interface with any central processor, according to the company.

Bit densities up to 1800 bit/in. are possible in all SA 7000 Series memories. Average access time is 8.7 msec at 3600 rpm. The company claimed to have had less than one data error in 10^{11} bits under normal operating conditions.

The units range in cost from $15,300 for the 10 million bit drum to $56,400 for the 150 million bit system.

ExpandaCore From Cambridge Features 4K to 16K Expansion

NEWTONVILLE, Mass. – Cambridge Memories, Inc. has announced a complete 16,284-word eighteen-bit memory system in a rack-mountable 5-1/4 in. enclosure.

The system, a new version of the company's ExpandaCore-18 memory, includes a "closed cooling" technique which the company says had been previously used only in large computers. The cooling technique prevents foreign matter from entering the memory and eliminates fan filters.

The enclosed ExpandaCore memory system is available in a basic 4,096-word eighteen-bit version which may be expanded in 4,096-word increments by plugging in an additional storage board containing a core stack and associated drive and sense circuitry.

The system is factory-wired to accommodate a full 16K system and is designed primarily for use as main memory in minicomputers. Other applications are expected in data terminals, digital controllers, numerical controllers, and digital communications buffers.

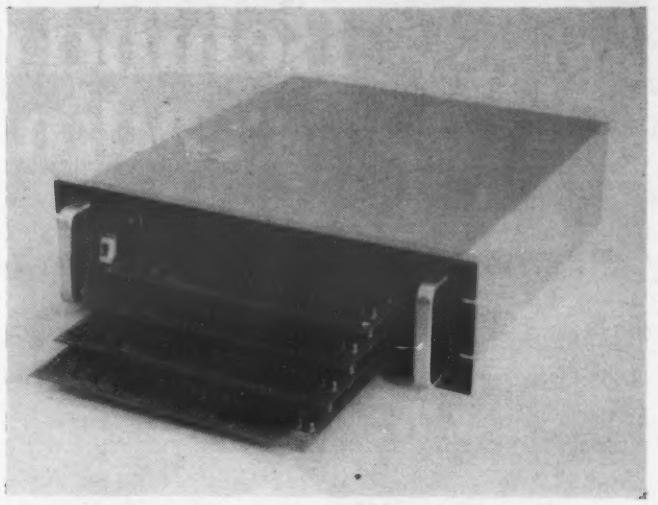
The memory features full cycle time of 1 μsec, and access time is 350 nsec over a 0° to 50° C temperature range.

Operating modules include read/restore, clear/write, read/modify/write and byte control, a feature which allows the system to perform as an 8- or 9-bit memory with no increase in access or cycle time.

The ExpandaCore-18 is a 3D, three-wire memory which requries +5V and -18V. In addition to reducing power supply costs, the minimum voltage requirement eases power distribution problems, the company said.

An internal failsafe mechanism protects against data loss in the event of power failure and allows the parent equipment to dump its registers into memory.

Delivery is 90 days for units with power; 60 days for units without power. A basic 4K by 18 system without power is priced at $4,065.



Cambridge Memories' complete 16,384-word eighteen-bit memory system in a rack-mountable 5-1/4-in. enclosure.

Intel RAM System Shown With 120 nsec Access Time

MOUNTAIN VIEW, Calif. – Intel Corp. has introduced a 256-bit bipolar random-access LSI memory (RAM) that operates with a companion decoder to make mainframe memories with a 120 nsec maximum access time, according to the firm.

Type 3102 memory unit works with Type 3202 decoder to form fully decoded memories storing up to 4096 words of any length, Intel said. For example, 512 memory units plus 32 decoders will store 4096 32-bit words.

The assembled memory is TTL compatible and dissipates only 1.5 mW per bit, permitting high-density packing configurations, the firm claimed.

Both memory unit and decoder exhibit only 10 μsec input leakage current. Load current is only 0.25 mA for the decoder and 0.50 mA for the memory unit.

The memory units, which have a 256 x 1 organization, are addressed by means of four chip-selected inputs on the decoder. Both units are packaged in a 16-lead DIP.

The Type 3102 memory is priced at $80 in 1-24 lots; $65 in 25-99 lots, and $51.20 in 100-999 lots. The 3202 decoder costs $20 in 1-24 lots; $16.25 in 25-99 lots, and $12.80 in 100-999 lots. They are available from stock.

Intel is at 365 Middlefield Road.

Controls Research Keyboard Provides Full Ascii 128-Character Set at $300

SANTA ANA, Calif. – A keyboard that provides the full Ascii 128-character set is now available for immediate delivery from Controls Research Corp.

The Model #56A0118000 weighs 27 ounces and features two-shot molded keytops, hermetically sealed reed switch contacts and modular construction.

The unit uses a two-sided printed-circuit board with dimensions of 1.5 in. in profile by 5.5 in. in depth. One level of input voltage – 5 VDC ± 5% at less than 300 mA – is required. The unit is DTL/TTL compatible.

Keyboard wiring can be modified to enable the customer to obtain negative or positive logic as well as level or pulse strobe output, Controls Research said. Interlock protection is provided by "two-key rollover" circuitry, CRC added.

The 128-character Ascii has a total of 56 keys – 43 fixed code alphanumeric, three control keys and 10 unassigned keys which can be optionally encoded.

According to James P. Antrim, CRC vice-president of marketing, the immediate delivery is "a big plus for customers right now. There's no need to delay any development because of an imagined non-availability of keyboards."

The keyboard costs $300 for single units.

Motorola Makes Monitor With Television Raster

FRANKLIN PARK, Ill. – A general prupose 12-in. diagonal monitor has been designed for the computer peripheral industry by the visual products group of the Consumer Products Division of Motorola, Inc.

The solid state Model XM350 utilizes a television raster scan and includes a regulated power supply. The high resolution of the monitor is said to allow a display of 80 char/line.

Optional features of the XM350 include a non-glare etched faceplate, special phosphors, and separate sync inputs.

Alternate mounting methods and control locations can be supplied to suit customer requirements.

Motorola has also announced plans to introduce high performance 9-in. and 14-in. monochrome units and a 14-in. color model.

The price of the basic XM350 in quantities of 100 is $105. It is currently available 90 days ARO.

Motorola's Consumer Products Division is at 9401 W. Grand Ave.

Peripheral Equipment Shows Speedy Transports

CHATSWORTH, Calif. – Peripheral Equipment Corp. (PEC) has introduced a new line of 10-1/2 in. reel, tape transports with tape speeds up to 45 in./sec. The PEC 6000 Series transports are designed for use in minicomputer systems, data entry systems, and in off-line applications such as COM.

In making the announcement, Geoff Taylor, director of marketing for PEC, stated: "One look at the start/stop read envelope waveform will prove PEC has attained the high performance we claim. At 45 in./sec, there is no velocity transients, no ringing and no overshoot."

start/stop read envelope waveform will prove PEC has attained the high performance we claim. At 45 in./sec, there is no velocity transients, no ringing and no overshoot."

The 6000 Series

The NRZI synchronous transports offer 7- and 9-track NRZI Usasii and IBM compatible formats. The PEC 6600 Series features both 9-track 1600 bit/in. phase-encoded Usasii and IBM compatible formats.

Both series use 10-1/2 in. tape reels and operate at speeds from 12.5 to 45 in./sec with a fast rewind of 150 in./sec. They are available in read-after-write, with a dual gap head; and in write-read, and read only models as well.

Purchased in quantities of 100, the NRZI read-after-write synchronous transport sells for $3,150, and the NRZI write-read models for $2,930. Seventy-two models of read only are also available.

New OEM Products

Orion Tape Units Bow

SUNNYVALE, Calif. – Orion Products Co., Inc. is now marketing custom-designed store and forward magnetic tape memories.

The units are said to be based on a combination of electronic buffering and shift devices and the "Newell" tape drive concept. Interfacing controllers are available for remote operation, the firm said.

The simplest versions use single channel serial recording. When used with parallel inputs the data is serialized and ready for direct coupling to a transmission line.

Reconstitution of the parallel channel format on playback is provided when interfacing with typical computer tape systems the firm said. Continuous or incremental recording and playback as well as bidirectional playback are available as options.

The firm is at 155 San Lazaro Ave.

Fairchild Develops Decoders

MOUNTAIN VIEW, Calif. – Fairchild Semiconductor Division of Fairchild Camera and Instrument Corp. has announced a dual one-of-four decoder/demultiplexer for application in such areas as logic control, demultiplexing and latch selection.

The MSI 9321 features two independent decoders, each designed to accept two binary weighted inputs and provide four mutually exclusive active low outputs. The decoders have active low enables.

The unit has a TTL design and achieves a typical propagation delay of 15 nsec from enable to output. It is said to provide interface with DTL, LPDTL, TTL and other MSI devices.

Power dissipation is typically 150 mV. The units, in a flatpack, commerical grade configuration, can cost as low as $5.85 in 100-999 quantities.

Fairchild is at 313 Fairchild Drive.

Brady Tape Leaders Debut

MILWAUKEE, Wis. – Computer tape leader connectors have been developed for use with Burroughs tape drives by the W.H. Brady Co. The leaders are also said to work on NCR, GE and other tape units.

The leader connectors are available in both female and male configurations, Brady said, and they are made of .002 in. thick polyester film.

The firm's computer supplies division is at 3333 W. Cameron Ave.

Counters Count at Dyonics

WOBURN, Mass. – A new preset counting unit which is a one decade, thumwheel preset TTL counter with automatic end of cycle reset, is now available from Dyonics Inc.

The units may be ganged to count batches of up to one million, and buffered count circuitry permits addition of almost any number of preset levels and addition of digital display, the firm said.

The units are DTL-TTL compatible and mount on half-in centered 15 position edge connectors. Each unit measures 2-1/2 in. by 3-5/8 in.

Dyonics is at 71 Pine St.

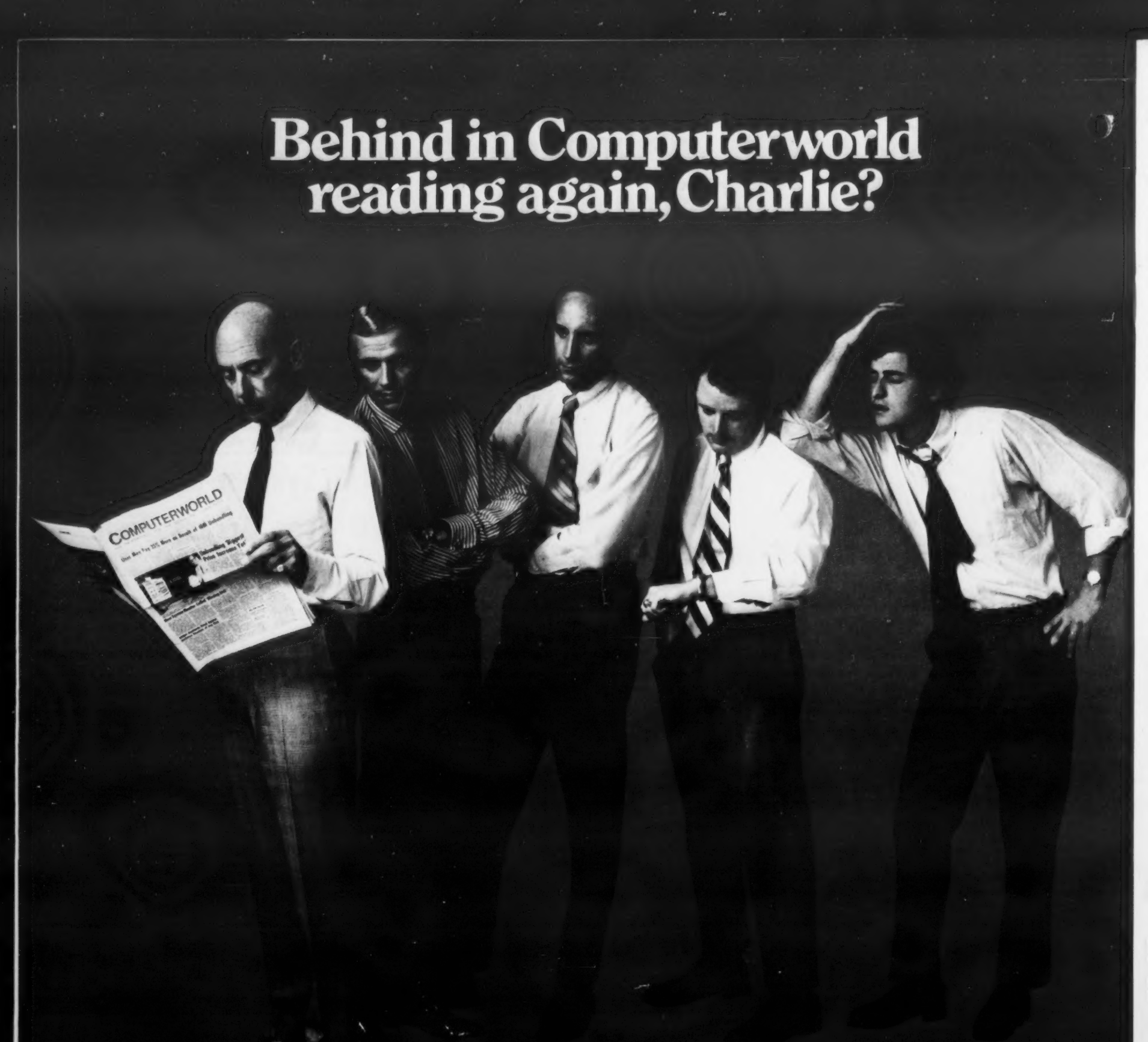
Cybermation Controller

WASHINGTON CROSSING, Pa. – A controller that permits direct communication between any typical minicomputer and moving-head, removable disk, bulk-data storage devices such as the IBM 2311, 2314, or equivalents, has been developed by Cybermation Inc., Washington Crossing Pa.

Delivery for the System 23 is eight to 12 weeks, depending on the configuration. The unit price is $10,000.

Cybermation Inc. is at River Road.

Behind in Computerworld reading again, Charlie?



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Many See Slump 'Bottoming'

Firms Feel 'Worst' Is Over, but Future Still Unsettled

By Alan Drattell
CW Washington Bureau

WASHINGTON – Most firms in the computer industry agree with the Commerce Department that the worst is over, that the bottom of the current slump is here.

But no one is kicking up his heels over an upswing in the economy – yet.

That's the general impression garnered from a CW survey of industry firms at various locations around the country.

The past six months have been a traumatic period for the industry that previously felt itself to be recession proof. It found that it could be affected – deeply in some cases – by a general slowdown in the economy.

An Optimist

Herbert S. Bright, president of Computation Planning Inc., a software house based in Bethesda, Md., was one of the optimists. "The recession has bottomed out from our company point of view, and we should be barely in the black for the fiscal year. People, however, are no longer numb in this industry as they were for a while, primarily because things we've done before are now beginning to pay off."

A Pessimist

Stephen Speltz, vice-president marketing, Sola Electric Co., a division of Sola Basic Industries, is more pessimistic seeing the economy as "still falling," attributing his company's business condition to a "slowdown in incoming orders." He opined: "the situation may improve, but don't look for a complete turnaround until the first of the year."

Mitch Morris, vice-president of Advanced Systems, Inc., Mt. Prospect, Ill., said: "We're in an expanding field to begin with, and in terms of the general economy, we're kind of a lagging indicator. We have not felt this recession as much as other companies have. In terms of the general economy, we're probably just hitting the bottom now. At least I like to think that way."

A software house in Atlanta, Management Science America, sees the indicators showing a bottoming out of the recession. Said F. William Botts Jr., president and chairman, "I don't think the EDP industry will benefit from the full effect of these indicators for another year, however. With tight money, people buy only what they absolutely need. Hence, computers that would be nice to have go out the door and people hang on to only those they need."

GE Time-Sharing 'O.K.'

A spokesman for GE said that the company's time-sharing service business – which is not a part of the joint computer venture with Honeywell now pending approval by the U.S. Government and Honeywell stockholders – is good and is running on budget for the year to date.

System 370

An official with Data Processing Financial & General Corp., a leasing company in New York City, said it was difficult to read the recession on his company because of the uncertainty IBM's newest computer family, System 370, will present. "The money is still coming in," he said, referring to current leases, "although sometimes we get paid late, even from the big customers."

Meanwhile, David Ferguson, president of Programmatics Inc. in Los Angeles, reported that the economy has bottomed out for his company. Customers have gone through their layoffs and due to short staffs "our position has strengthened as we are selling things they need."

Jake Konen, director of product management for Stromberg Data Systems in San Diego, added that things are starting to stabilize and turn around. As he put it, "Customers who have been holding off are getting back to making decisions instead of just cutting costs and payrolls. The indicators are there; they actually haven't turned into sales yet."

Data Action Unaffected

R.W. Clarke, president of Data Action in Minneapolis, a peripherals manufacturer, said: "We have not experienced difficulties due to the general economic slowdown. This is partly because we are a lease-oriented business which requires a minimal capital outlay by the customer. Additionally, our equipment can be readily cost-justified by the user.

"We have recently seen a few signs of possible turnaround. For example, components suppliers are indicating that orders formerly held are now being released by other companies. This is in contrast to the situation two months ago.

"We are carefully watching for additional signs of a loosening up in the economy. However, we don't believe there is a strong hoped-for upturn in the near future."

One manufacturer, Telex in Tulsa, was extremely optimistic. Said Steve Jatras, president, "The slowdown in the economy has not hurt us. In fact, our earnings and sales are up over last year's." The reason, according to Jatras, is that Telex is in the business of replacing IBM tapes and tape drives and this "means cost savings" to the end user.

IBM Opinion

A spokesman for IBM stated: "We think the economic downturn in general, this is taking the economy as a whole, has bottomed out. But we don't want to speculate what this might or might not mean to the computer industry."

Meanwhile, several manufacturers and service companies have tried to look beyond the immediate effects of the slump to gauge its long-range ramifications.

Effects Seen

"I think the recession will have a fantastic effect," said Fred C. Ihrer of Comress, Rockville, Md. "It will make everyone view computers in a realistic way and will put the EDP industry on a business-like basis and tend ultimately to counteract some of the horrible inflationary salary structure in the industry. I feel we oversold EDP to the end user and didn't save him money. He realized this when the recession came and he began to knock off unprofitable operations, including EDP. EDP has gotten a black eye and therefore is highly suspect for cost reduction."

A note of warning on the long-term effects of the current inflation was sounded recently by J. Frank Foster, president and chairman of Sperry Rand Corp.

"I must point out that the inflation we are encountering in the U.S.," Foster said, "is going to make us and other companies less competitive abroad."

While not all of the votes are in, most observers are seeing "light at the end of the recession tunnel" for the EDP industry. What the lasting effects of the slowdown will be, however, is impossible to predict by industry observers now.

This article was prepared with the aid of Phyllis Huggins, CW West Coast Bureau, Arden P. Kosatka, CW Washington Bureau, and Thomas J. Morton, CW Midwest Bureau.

Ampex Enters Semi Memory Market, Expects to Install 50 Units by Year End

REDWOOD CITY, Calif. – Ampex Corp., a leading supplier of core memories and tape drives, is the latest entry attracted to the growing semiconductor memory derby.

Confirming industry suspicions his company would show solid state memory systems late this year, possibly at the FJCC, Ampex President William E. Roberts told a recent gathering of security analysts in New York that Ampex not only "believes in semiconductor memories" but has already entered the market.

Chip Fabrication

"We have developed working relations with a number of semiconductor organizations to have chips fabricated to our memory system design," Roberts said. "We are also developing the capability to package these chips in the Far East.

"We will be buying the wafer and doing the slicing ourselves, therefore approaching the field at different levels starting with the memory system design at one end, the packaging, the slicing, and ultimately the fabrication of the basic chips ourselves. That will be the last step."

The result of this timetable, Roberts indicated, "will be shown in solid state memory systems that will be introduced this year."

Roberts mentioned, however, that while his company believes strongly in semiconductors, it still has a healthy attitude toward core memory. "We anticipate that conventional core memory systems will continue to show a very fine rate of growth for every one of the next five years."

The firm's executive vice-president, A.H. Hausman, warned, however, that "a lot of the projections of the cost to produce and make a profit on solid state memories are a little bit optimistic .... We think semiconductor memories will make it. But we think it will take a little bit longer to produce them profitably than many others do."

Ampex has installed some 10 mass memories so far this year, with six to eight on order, he said, adding, "We should have more than 50 of these memories installed by year-end, with sales dollar value of the units we expect to deliver bringing in the neighborhood of $13.5 to $14 million."

Nonetheless, Roberts feels that solid state memories will "supplement core memory growth and eventually become larger in dollar volume by 1975."

Since a number of companies both within and outside the core memory system business have joined the race for their share of this projected purse, it appears more strongly Ampex will reveal solid state memory systems at the 1970 FJCC.

MAI Says Sales, Income Lag in Latest Nine Months

NEW YORK – Management Assistance Inc. (MAI) has reported a loss of $3,535,676 or 74 cents per share on operations in the nine-month period ended June 30.

The loss – which was almost five times the $764,574 (25 cents per share) reported for the same period a year ago – came on revenues of $48,680,865, which were down from the $54,006,162 in sales chalked up in the same nine-month period in 1969.

The loss for the nine months is reduced to $1,649,676 or 32 cents per share through an extraordinary item of $2,160,000.

The extraordinary credit represents the minimum payable by Potter Instrument Co. Inc. on or before Aug. 31, 1974, as a result of the previously announced [CW, March 11] settlement of arbitration and litigation claims.

Under the settlement, periodic payments to be made to MAI range from $2,160,000 minimum to maximum of $5,600,000. During the arbitration, MAI charged Potter with breach of contract when Potter began selling its equipment directly to end users.

MAI also reported that it has paid the last installment due on its collateral trust equipment notes.

Sanders Forms Lease Company With Randolph

NASHUA, N.H. – Sanders Associates, Inc. and Randolph Computer Corp. have formed a new leasing company under joint ownership.

The new firm will purchase up to $20 million worth of Sanders' display equipment for lease, according to Sanders' Treasurer Joel Kosheff. Sanders will continue to provide all maintenance, field support, and administrative services for its customers.

Walter E. Heller & Co. Inc. will head a group of financial institutions providing senior financing for the new firm. Equity financing will come from Randolph and Sanders.

L-T Shows Profits For 1st Quarter

NEW YORK – Ailing Levin-Townsend [CW, Aug. 12] has taken a slight turn for the better.

Close on the heels of its year-end statement for the year ended March 31 reporting a loss of almost $28.8 million, the firm has released first quarter fiscal 1971 figures showing earnings of $591,897 (18 cents per share) on revenues of $15.7 million.

The earnings were below the income of $2.4 million or 72 cents per share reported on a gross of $16.2 million in the same quarter a year earlier.

The loss reported in fiscal 1970 had included write-offs of $26.3 million relating primarily to the firm's now discontinued business in Las Vegas hotels, real estate, and casinos.

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'Clean' System Could Lead Way in Law Enforcement

By Edward J. Bride
CW Staff Writer

HARRISBURG, Pa. – Pennsylvania State Police have chosen Univac to provide the $5 million computer-based information system that could become a forerunner for similar systems in police departments around the country.

Scheduled for implementation next April, the system will be known as the Commonwealth Law Enforcement Assistance Network (Clean), and will consist of two Univac 418-III computers and associated equipment.

The commonwealth will become the first such organization in the country to utilize video display scopes, the Uniscope 100, instead of standard teletypewriter terminals, according to Univac [CW, March 4].

Most police organizations use teletypewriter terminals, which are slower and noisier than video terminals, and which require more of the dispatcher's time to operate.

Clean terminals will be capable of producing a printed copy of any messages, if required.

There will be a total of 291 locations, which will include 91 state police installations and the control rooms of about 200 local police agencies.

James W. Barnes, director of information systems for the state police, said that about 90% of the 1,160 police departments in the state will be serviced by the new system.

Many smaller townships, Barnes said, whose size would not justify having their own visual display, will be serviced by terminals operated by other nearby departments.

The equipment will be leased from Univac, and will be installed at the State Police Academy in Hershey.

Protect Citizens, Police

The director of the state police's bureau of technical services, Maj. Albert F. Kwiatek, remembers the loss of two policemen's lives, which might have been prevented if this system had been installed a year ago.

Kwiatek recalled two separate instances where a patrolman stopped a car for a routine check. In each case, the car had been stolen, and the officer was shot and killed upon approaching the car.

The system is the most advanced police operation to be announced since the unveiling of California's Law Enforcement Telecommunications System (Clets) last Spring [CW, May 20]. That system, also valued at $5 million, is comprised of four RCA Spectra 70s and associated equipment.

On-Line With FBI

Like most state systems becoming operational, Clean will have direct connection with the FBI's National Crime Information Center (NCIC), which stores similar information on stolen cars, wanted persons, stolen property and stolen and recovered guns.

NCIC also records stolen securities, which represents a rapidly increasing facet of that operation.

Through a link to the Pennsylvania Bureau of Motor Vehicles here in the state capital, Clean will have access to files on any of the 5.7 million vehicles and 6.3 million drivers registered in the state.

Additionally, the computers will direct the transmission of all messages within the network on a point-to-point and point-to-region basis.

It will also be used for obtaining statistical information on crime and for compiling administrative data.

Hardware mainstays are the two central processors, each equipped with a main memory storage capacity of 65K words, and a smaller Univac 9300 to be used for inputting information into the 418-111 and for printing statistical reports.

The system will include 32 Univac 8414 disk memory units containing over 800 million characters of information, two high-speed drums, and eight magnetic tape units.

Clean will replace the teletypewriter communication network, which was installed in 1929.

Our September 30th Mainframes Supplement:

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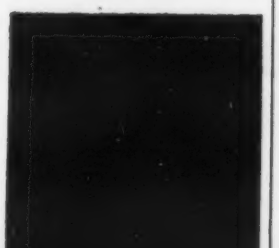

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Computer Usage Loss Reported For Nine Months

GREENWICH, Conn. – Computer Usage Co., which had financial difficulties long before the current economic slowdown, has reported another unprofitable quarter.

For the nine months ended June 30, the firm reported a loss of $1,582,825 ($1.86 per share) on total revenues of $4,546,632.

The loss was almost double the loss of $724,507 reported during the same period last year, when the firm had sales of $9,447,800 – more than double the sales reported in the first nine-month period this year.

For the first half of the year, the firm reported a loss of $1,071,019 or $1.26 per share on revenues of $3,295,031 – up from the loss of $425,152 or 50 cents per share announced a year earlier.

In a letter to shareholders, recently elected President Victor E. Bartoletti said: "The results of operations during the third quarter remained unprofitable and we have continued to experience a decline in revenue from our traditional business of analysis and programming.

"Since I assumed the position of president and chief executive officer on May 20 we have placed increased emphasis on obtaining new business, improving the effectiveness of our operations and searching for new sources of revenue. In order to achieve these objectives, we have strengthened our marketing capability and are making a major effort to obtain new facility management business and to sell and license proprietary software packages developed by ourselves and others.

"We continue to be optimistic about our ability to return your company to profitability . . . ."

During the full 1969 fiscal year, Computer Usage reported a loss of $1,536,586 ($1.81 per share) on sales of $11,466,202. To date this year, quarterly losses have been running about $200,000 ahead of last year's figures.

The nine month statement includes an extraordinary charge of $212,914 "representing losses arising from the discontinuance of certain operations and the closedown of related facilities."

TRADE*QUOTES

Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE*QUOTES Division of National Information Services, Inc. Cambridge, Mass. 02139

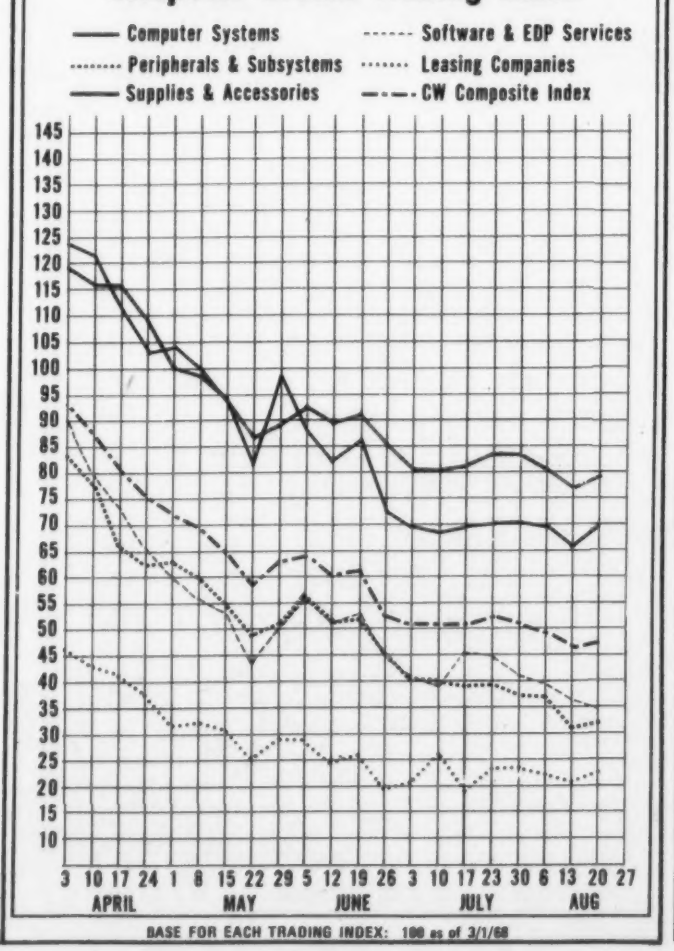
CLOSING PRICES THURSDAY, AUGUST 20, 1970

EXCH		1970 RANGE (1)	CLOSE AUG 20 1970	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 6	1 1/4	0	0.0
A	APPLIED DATA RES.	4- 24	5 5/8	+1 5/8	+40.6
O	APPLIED LOGIC	2- 19	2 1/4	- 3/8	-14.2
O	ARIES	1- 8	1 1/4	- 1/8	-9.0
A	AUTOMATIC DATA PROC	23- 47	27 1/2	+1 1/2	+5.7
O	AUTO SCIENCES	4- 14	4 1/4	+ 1/4	+6.2
O	BRANDON APPLIED SYS	1- 9	1	- 1/2	-33.3
O	COMPUTER AGE INDUS.	1- 3	1	0	0.0
A	COMPUTER APPL	2- 12	2	0	0.0
O	COMPUTER ENVIRON	3- 14	2 3/4	0	0.0
N	COMPUTER INDUS.	2- 10	3	0	0.0
O	COMPUTER NETWORK	5- 14	6 1/4	+ 1/4	+4.1
O	COMPUTER PROPERTY	5- 15	5 1/4	- 1/4	-4.5
N	COMPUTER SCIENCES	6- 34	6 7/8	+ 1/4	+3.7
O	COMPUTER USAGE	2- 8	3	+ 3/4	+33.3
A	COMPUTING & SOFTWARE	16- 75	18 7/8	- 1/2	-2.5
O	COMRESS	2- 10	2 1/8	- 1/8	-5.5
O	COMSHARE	3- 15	3 1/8	- 1/8	-3.8
O	CONSOL. ANAL. CENT.	1- 5	7/8	0	0.0
O	DATA AUTOMATION	1- 24	1 7/8	+ 5/8	+50.0
O	DATA PACKAGING	5- 29	5 3/4	- 1/4	-4.1
O	DATAMATION SERVICE	1- 6	1 1/4	+ 1/4	+25.0
O	DATATAB	5- 9	5	- 1/8	-2.4
O	DIGITEK	4- 5	2 1/8	- 1/8	-4.5
O	EDP RESOURCES	5- 13	4 1/2	-1	-18.1
A	ELECT COMP PROG	3- 11	2 7/8	0	0.0
O	ELECTRONIC DATA SYS.	31-161	43 1/2	-3	-6.4
O	INFORMATICS	4- 21	5 3/8	- 1/8	-2.2
A	ITEL	6- 26	7 1/2	- 3/8	-4.7
O	LEVIN-TOWNSEND SERV.	1- 13	2 3/4	+ 1/4	+10.0
A	MANAGEMENT DATA	8- 25	8 3/4	+ 3/4	+9.3
O	NAT COMP ANALYSTS	2- 8	2 1/4	- 3/4	-25.0
O	NAT.COMP. SERV.	3- 12	4 3/4	- 1/2	-9.5
N	PLANNING RESEARCH	13- 54	15 5/8	+ 5/8	+4.1
O	PROGRAMMING METHODS	9- 27	9 1/2	0	0.0
O	PROGRAMMING & SYS	2- 5	2	0	0.0
O	PROGRAMMING SCIENCES	2- 33	2	0	0.0
N	SCIENTIFIC RESOURCES	2- 22	2 1/2	+ 1/2	+25.0
O	SOFTWARE SYSTEMS	1- 2	3/4	+ 1/8	+20.0
O	TBS COMPUTER CENTERS	6- 27	6 1/2	- 1/2	-7.1
O	UNITED DATA CENTER	2- 4	2 5/8	+ 1/8	+5.0
N	UNIVERSITY COMPUTING	14- 99	15 1/8	+1 1/8	+8.0
A	URS SYSTEMS	5- 21	5 1/8	0	0.0
O	U.S. TIME SHARING	5- 14	5 3/8	- 1/8	-3.5
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	21- 62	25 3/4	+1 1/8	+4.5
O	ALPHANUMERIC	2- 15	2 7/8	0	0.0
N	AMPEX CORP	13- 48	14 1/2	+1	+7.4
A	ASTRODATA	4- 34	5 3/4	- 1/4	-6.2
O	BOLT,BERANEK & NEW	3- 11	6 1/8	+ 1/8	+2.0
N	BUNKER-RAMO	6- 14	6 7/8	- 1/4	-3.5
A	CALCOMP	11- 33	11 1/2	+ 5/8	+5.7
O	COGNITRONICS	3- 15	3 1/4	+ 1/4	+8.3
O	COLORADO INSTRUMENTS	4- 15	6 1/4	+ 1/8	+2.0
O	COMPUTER COMMUN.	5- 36	4 3/4	-1	-17.3
A	COMPUTER EQUIPMENT	4- 12	3 7/8	- 1/8	-3.1
A	COMPUTEST	13- 28	13 3/4	-1 5/8	-10.5
A	DATA PRODUCTS CORP	5- 26	5 3/8	+ 1/4	+4.8
O	DATA TECHNOLOGY	5- 23	5 3/8	+ 1/4	+4.8
O	DIGITRONICS	5- 13	4 1/2	- 1/4	-5.2
N	ELECTRONIC M & M	7- 40	7	0	0.0
O	FABRI-TEK	3- 8	2 7/8	- 3/8	-11.5
O	FARRINGTON MFG	2- 17	2 1/2	0	0.0
O	INFORMATION DISPLAYS	5- 20	5 1/4	0	0.0
A	MARSHALL INDUSTRIES	14- 67	16	+1 5/8	+11.3
A	MILGO ELECTRONICS	15- 84	20 1/8	+1 1/4	+6.6
N	MOHAWK DATA SCI	19- 87	19 3/4	+1 1/4	+6.7
O	OPTICAL SCANNING	11- 52	13	+1	+8.3
O	PHOTON	4- 17	7 1/4	- 1/8	-1.6
O	PHOTO-MAGNETIC SYS.	1- 4	1 1/2	+ 1/4	+20.0
A	POTTER INSTRUMENT	15- 42	16 3/8	+ 3/8	+2.3
O	PRECISION INST.	6- 25	6 1/4	-2	-24.2
O	RECOGNITION EQUIP	13- 83	15 1/4	+2	+15.0
O	REDCOR CORP.	4- 34	4 3/8	- 1/4	-5.4
N	SANDERS ASSOCIATES	7- 29	9 1/4	+ 1/4	+2.7
O	SCAN DATA	6- 53	6 1/2	0	0.0
O	TALLY CORP.	10- 23	10 1/4	- 1/4	-2.5
N	TELEX	10- 25	9 1/2	- 3/4	-7.3
O	VIATRON	5- 51	4 1/2	- 3/4	-14.2
	SUPPLIES & ACCESSORIES				
N	ADAMS-MILLIS CORP	8- 15	10 1/4	+ 3/8	+3.7
O	BALTIMORE BUS FORMS	11- 21	10 1/2	0	0.0
A	BARRY WRIGHT	6- 25	6 7/8	- 1/8	-1.7
A	DATA DOCUMENTS	15- 35	15 3/4	- 1/2	-3.0
N	ENNIS BUS. FORMS	11- 19	13 1/8	- 1/8	-0.9
O	GRAPHIC CONTROLS	7- 17	6 3/4	- 1/8	-1.8
N	MEMOREX	46-166	51 1/8	+3 7/8	+8.2
N	3M COMPANTY	71-114	81 1/2	+1 5/8	+2.0
O	MOORE BUS. FORMS	27- 38	29 3/8	- 1/8	-0.4
N	NASHUA CORP	21- 43	28 3/8	+ 1/2	+1.7
O	REYNOLDS & REYNOLD	25- 48	26	-1 1/4	-4.2
O	STANDARD REGISTER	17- 30	18 1/4	+ 1/4	+1.3
N	UARCO	22- 39	23 1/2	+ 3/4	+3.2
A	WABASH MAGNETICS	7- 30	7	- 1/2	-6.6
O	WALLACE BUS FORMS	25- 41	33	+ 1/4	+0.7

EXCH		1970 RANGE (1)	CLOSE AUG 20 1970	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	78-173	92 3/8	+4 1/4	+4.8
N	COLLINS RADIO	9- 37	11 5/8	+ 7/8	+8.1
N	CONTROL DATA CORP	30-122	32 1/2	- 3/8	-1.1
A	DIGITAL EQUIPMENT	50-124	60 1/4	+5 3/4	+10.5
N	ELECTRONIC ASSOC.	3- 11	3 3/4	0	0.0
A	ELECTRONIC ENGINEER.	3- 14	4 1/4	- 1/4	-5.5
N	FOXBORO	18- 39	19	+ 5/8	+3.4
O	GENERAL AUTOMATION	9- 42	9	0	0.0
N	GENERAL ELECTRIC	60- 77	76 1/4	+2 3/4	+3.7
N	HEWLETT-PACKARD CO	19- 45	21 1/2	+2 1/8	+10.9
N	HONEYWELL INC	65-152	80 3/4	+1 3/8	+1.7
N	IBM	223-387	244 3/4	+21 3/4	+9.7
N	NCR	30- 86	32 3/8	+2 1/8	+7.0
N	RCA	18- 34	23 3/4	+1 1/2	+6.7
N	RAYTHEON CO	16- 33	17 1/2	- 3/8	-2.0
O	SCI. CONTROL CORP.	1- 8	2	- 5/8	-23.8
N	SPERRY RAND	19- 40	21 1/4	+2 1/4	+11.8
A	SYSTEMS ENG. LABS	10- 49	11 1/8	- 1/2	-4.3
N	VARIAN ASSOCIATES	9- 29	10 5/8	- 3/8	-3.4
A	WANG LABS.	18- 51	24 3/8	+2 3/4	+12.7
N	XEROX CORP	66-115	70 1/2	+4 1/2	+6.8
	LEASING COMPANIES				
O	BOOTHE COMPUTER	8- 25	9	+ 3/4	+9.0
O	BRESNAHAN COMP.	3- 9	2 1/2	- 1/2	-16.6
O	COMPUTER EXCHANGE	2- 8	5	- 3/8	-6.9
O	COMPUTER LEASING	4- 18	5	0	0.0
N	DATA PROC. F & G	6- 32	8 1/8	+ 3/8	+4.8
O	DATRONIC RENTAL	2- 8	2 1/2	- 1/8	-4.7
A	DEARBORN COMPUTER	10- 24	13 3/4	+1 3/4	+14.5
O	DIEBOLD COMP. LEAS.	2- 8	3 1/8	+ 3/8	+13.6
A	DPA, INC.	3- 10	3 7/8	+ 1/4	+6.8
A	GRANITE MGT	7- 22	8 1/2	- 3/4	-8.1
A	GREYHOUND COMPUTER	5- 44	5 1/8	0	0.0
N	LEASCO DATA PROC.	7- 30	8 3/8	+ 1/4	+3.0
O	LECTRO COMP LEAS	2- 5	2	0	0.0
A	LEVIN-TOWNSEND CMP	3- 19	4 1/2	+ 1/4	+5.8
O	LMC DATA, INC.	1- 3	1 3/8	0	0.0
O	MANAGEMENT ASSIST	1- 4	1 1/2	+ 1/8	+9.0
O	NCC INDUSTRIES	3- 8	3 5/8	+ 1/4	+7.4
O	SYSTEMS CAPITAL	2- 8	2 1/4	- 1/2	-18.1
A	U.S. LEASING	3- 19	11 1/4	+ 1/4	+2.2

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Earnings Reports

CIC LEASING CORP.
Three Months Ended May 31

	1970	1969
Shr Ernd	$.15	$.14
Revenue	1,062,000	685,110
Income	175,169	171,599

COMPUTER TASK GROUP INC.
Three Months Ended March 31

	1970	1969
Revenue	$263,417	$137,080
Income (Loss)	341	(31,886)

BALTIMORE BUSINESS FORMS
Three Months Ended June 30

	1970	1969
Shr Ernd	$.14	$.21
Revenue	4,214,826	4,376,552
6 Mo Shr	.35	.51
Revenue	8,684,833	8,941,550
Earnings	266,034	376,500

TELEX CORP.
Three Months Ended June 30

	1970	1969
aShr Ernd	$.23	$.08
Revenue	16,750,000	9,459,101
Earnings	2,337,000	771,074

a-On a primary basis and after giving effect to a five-for-one stock split on May 1, 1970.

WANG LABORATORIES INC.
Year Ended June 30

	1970	1969
Shr Ernd	$.77	a$.72
Revenue	26,823,132	23,263,435
Earnings	3,002,118	2,801,513
3 Mo Shr	.38	a.29
Revenue	9,660,637	7,486,657
Earnings	1,497,427	1,124,843

a-Adjusted to reflect a 100% stock dividend in November, 1969.

COGNITRONICS CORP.
Three Months Ended June 30

	1970	1969
Revenue	$995,618	$721,129
Loss	62,429	148,225
6 Months		
Revenue	1,857,106	1,478,378
Loss	144,518	234,385

GAC CORP.
Six Months Ended June 30

	1970	a1969
Shr Ernd	$1.27	b$1.62
Revenue	194,288,893	157,289,289
Earnings	13,009,081	15,305,864
Spec Chg	.....	c431,000
Earnings	13,009,081	e14,874,864

a-Restated to reflect an acquisition on a pooling-of-interests basis. b-Based on income before special charge. c-From discontinuance of corporation's Aetna Steel Products Mfg. unit. e-Equal to $1.57 a share.

MILGO ELECTRONICS CORP.
Three Months Ended June 30

	1970	1969
Shr Ernd	$.36	a$.06
Revenue	3,802,000	2,325,000
Earnings	549,000	88,000
Spec Cred	.....	b106,000
Net Earn.	549,000	c194,000
a9 Mo Shr	.88	.06
Revenue	10,574,000	5,615,000
Earnings	1,343,000	89,000
bSpec Cred	440,000	386,000
cNet Earn	1,783,000	475,000

a-Based on income before special credits and 1969 adjusted for a two-for-one stock split in March, 1970. b-From tax loss carry-forwards and also from sale of product rights in the nine months of 1969. c-Equal to $1.17 a share in the nine months of 1970 compared with 33 cents in the same period of 1969, and equal to 14 cents a share in the three months of 1969.

SPERRY RAND CORP.
Three Months Ended June 30

	1970	1969
Shr Ernd	a$.50	$.46
Revenue	427,127,000	409,459,000
Earnings	17,175,000	15,669,000

a-Includes a net capital gain of 6 cents a share realized from the sale of the company's Ford instrument facility on Long Island.

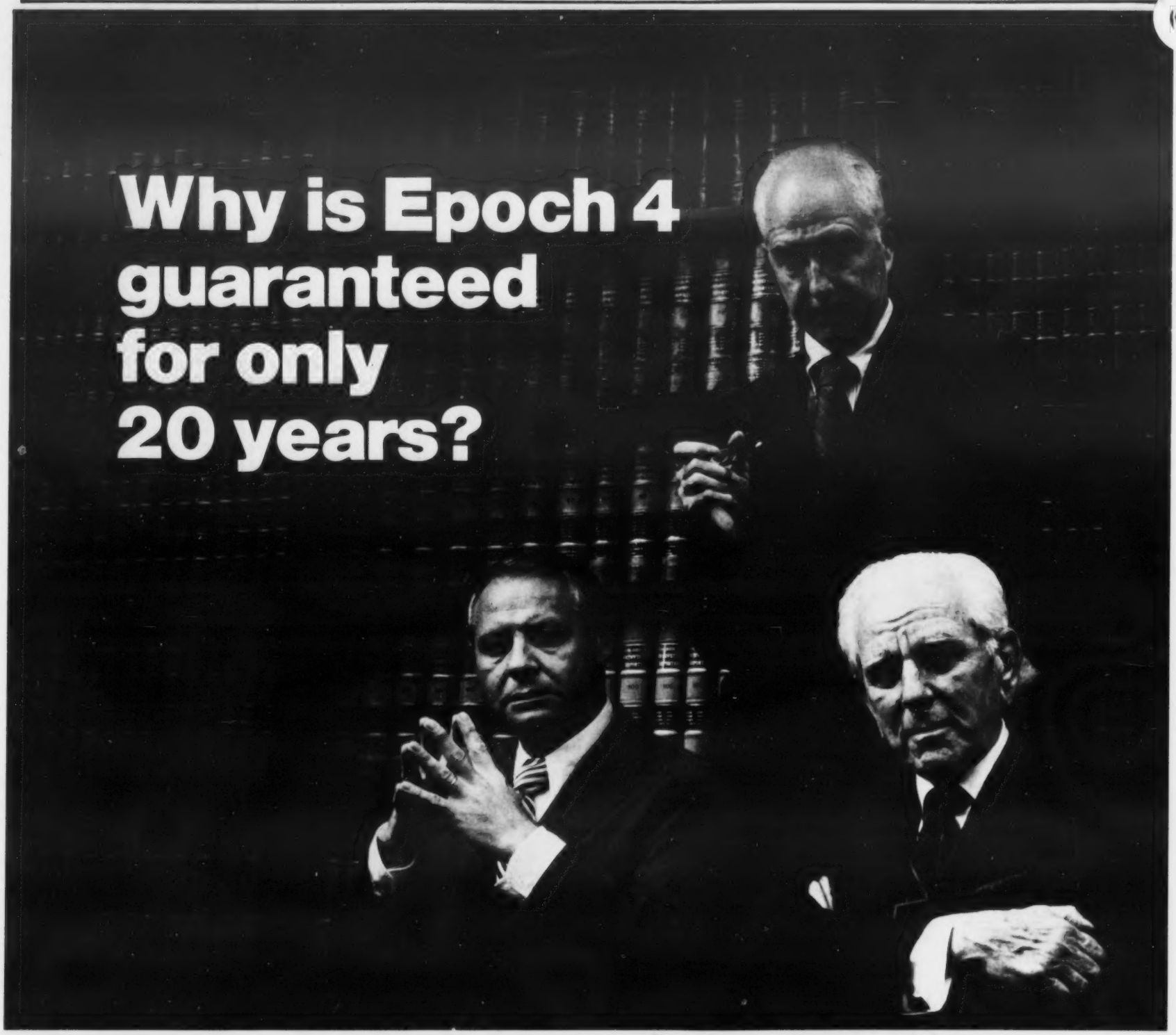
MINNESOTA MINING & MANUFACTURING
Three Months Ended June 30

	1970	b1969
aShr Ernd	$.84	$.82
Revenue	425,000,000	406,600,000
Earnings	47,100,000	45,900,000
a6 Mo Shr	1.62	1.55
Revenue	832,400,000	785,600,000
Earnings	90,600,000	86,500,000

a-Based on common and common equivalent shares as computed by company. b-Restated.

FABRI-TEK INC.
Three Months Ended July 3

	1970	1969
Shr Ernd	.....	$.04
Revenue	$5,497,812	4,549,462
Earnings	3,298	126,040



Our lawyers wouldn't let us say "forever."

We figure a 20-year warranty will make our point, even if we can't legally say "forever." *Epoch 4's new coating is so tough, so flexible and resilient, that it withstands the kind of handling that would instantly kill a conventional computer tape.*

Put another way, Epoch 4's new coating is 8000% tougher than the best competitive products on the market.

We're serious about the 20-year warranty. Because we're serious about Epoch 4's fantastic performance.

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